# Worktime control and new ways of working: A work psychological perspective

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# **Worktime Control and New Ways of Working:**
## A Work Psychological Perspective

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# Contents

# Chapter 1

## General Introduction

## 1.1. Background

During the past decades, the world of work has significantly changed. Due to both globalization and privatization of the markets, organizations nowadays face competition on a larger scale than ever before. Rapid developments in technology contribute to more dynamic markets, spurring organizations to stimulate innovation and efficiency in order to stay competitive. To meet such high business demands, many modern organizations adopted flexibility as a core business asset (e.g., *1-5*).

Flexibility in working times ('temporal flexibility') is one form of such flexibility. Numerous employees are now faced with some form of flexible working time arrangement. According to the European Foundation for the Improvement of Living and Working Conditions (*6*), 21% and 19% of European employees have shift work or night work respectively, 54% of all employees from the European Union work during the weekends at least once per month, 32% work more than 10 hours per day at least once per month, and 20% report to work on an on-call basis (Sixth European Working Conditions Survey: *6*).

Such temporal flexibility may be beneficial for the employer by allowing adjustments in work hours to meet fluctuating demands (*7-10*). Yet, the downside of employer-driven flexible working hours is that they can be taxing for the employee, being related to unpredictability or variability of working hours (*11, 12*), a disturbed balance between work and private life (*13*, *14*) and unfavourable health outcomes such as fatigue, cardiovascular disease, sleep disorders and mental health complaints (e.g., *14-17*).

One may hypothesize that improving employee based worktime flexibility may counteract the adverse side effects of demanding flexible work hours (e.g., *18*; *19*). Such employee-based flexibility is assumed to improve employees' vitality, work-home balance, motivation and productivity, and hence to be beneficial to both the organization and its employees (e.g., *19-21*). Throughout this dissertation, we refer to

employee-based worktime flexibility by the term 'worktime control' (WTC). In testing potential benefits of WTC, the main aim of this dissertation is to empirically examine the effects of WTC on employees' health and well-being, work-nonwork balance and job-related outcomes.

## 1.2. Definition and prevalence

Following earlier work (*10*, *17*, *18*), we define worktime control (WTC) as "an employee's possibilities of control over the duration, position, and distribution of worktime, i.e., autonomy with regard to worktime" (*18,* p.18).

WTC may come in many different *qualities* and *quantities*. Regarding its quality, employees' WTC may apply to one or multiple aspects (i.e., 'subdimensions') of working time, including the starting and ending times of the workday, how to distribute working hours over the work week, when to take a break, a day off or vacation, and whether or not (and when) to work overtime. Regarding its quantity, the level of WTC that is available may range from minimal requested deviations from fixed working schedules, to flexibility-within limits (e.g., flextime arrangements whereby some flexibility is provided in starting- and ending times around company-set core hours; or 'time-banking' whereby overtime work can be compensated by taking time off during some other period), to full, far-reaching worktime autonomy. In the latter case, the only restrictions are posed by working time legislation and contractual obligations (e.g., 'trust hours' [*7*], 'new ways of working' [*22*, *23*], or 'results-only work environment' [*24*, *25*]). In work settings including shift work, individual worktime flexibility is more difficult to realize due to, for example, continuous staffing needs and the interdependence between employees' rosters. In such cases, WTC could be achieved by indicating preferences to schedule-makers (low WTC), shift swapping (i.e., switching scheduled shifts with colleagues; when successfully done this could imply moderate WTC) or self-scheduling

(teams of employees design work schedules themselves with the help of schedule software, ideally resulting in high WTC).

Although increasingly popular, the presence of WTC is not at all new. The first known experiment on WTC occurred in Germany during the late 60's of the 20th century and involved a form of flextime, which was installed with the aim to increase employees' productivity (*18*, *26*). After positive outcomes were recorded, flextime spread to other countries and has been on the rise ever since. While initially such flexibility was most often introduced to improve productivity, the potential benefits for employees have gradually attracted more attention as more organizations started seeking for ways to uphold employees' well-being (*18*, *19*).

Now, almost 50 years later, flexible working hours are identified as a 'key issue for employers and workers' by the European Union (*8*). According to data from European Working Conditions Survey 2010, 41% of European workers reported to have some influence over their working time arrangements (data online available: *27*), with most flexibility found in Northern Europe (ranging from 53% to 65% in Norway and the Netherlands respectively). The most recent EuroFound Working Conditions Survey (2015) showed that, in general, 65% of European workers reported that it would be at least 'fairly easy' to take two hours off during working time for personal or family matters, 20% of employees are free to choose starting and ending times of each workday within limits (flextime) and 6% of employees have full autonomy over their work hours (*6*). From a representative sample of US employers, 41% reported to allow (at least some) employees to change starting and ending times on a daily basis, 40% provide employees with control over which shifts to work, and 45% report to allow control over overtime work (*28*).

These statistics suggest that some forms of WTC have become more common, but also reveal inconsistencies, as prevalence of WTC seems to depend on the exact WTC subdimension that is measured and the

country under study. Moreover, levels of WTC presumably fluctuate between different job types (*29*). Especially shift workers may have lower WTC than dayworkers, as shift work schedules are planned according to precise staffing needs and must be carefully matched on a department level. Even though WTC is gaining popularity in Western industrialized countries, there is currently a lack of detailed knowledge on the prevalence of employees' access to several individual WTC-subdimensions, employees' need for- and actual use of these WTC-subdimensions and how access to-, need for- and use of WTC varies over different work types, such as shift work and daywork.

Meanwhile, national governments across Europe adopt new regulations aimed at encouraging more employee-driven worktime flexibility. As of January 1st 2016, in the Netherlands a law has come into force that grants every employee the right to request employee-based flexibility regarding work time (e.g., flexible starting and ending times), which may only be refused by the employer on basis of substantial safety or business arguments (*30*). Laws that similarly aim at enhancing employees' temporal flexibility were recently introduced in the UK and Germany (*8*). Within the academic world, studies on WTC have been published in fields of occupational health, ergonomics, applied psychology and family or society studies, and flexible working hours now rank among the major topics in a number of international academic journals (e.g., *Scandinavian Journal of Work Environment and Health*, *Chronobiology*, *Applied Ergonomics*). Taken together, WTC is a rising topic both in academia and in the modern world of work.

## 1.3. Relevance of WTC: Societal and technological influences

The popularity of WTC can be understood when considering three challenges regarding the modern world of work:

i) The need for sustainable healthy work with a proper balance between demands and recovery opportunities;

ii) The challenge of successfully combining work and private life in the light of increasing integration between these life domains;

iii) Organizations' need to address preferences of a more diverse workforce in order to attract and retain a committed, skilful and healthy workforce.

Below, we theorize how WTC may constitute a tool to address each of these challenges, and how technological changes contributed to the rise of WTC applicability in practice.

### 1.3.1. Healthy work design

In Europe, work-related stress is one of the most common causes for ill health, causing symptoms like chronic fatigue, depression, disturbed sleep and cardiovascular disease (e.g., *31*, *32*). High task demands and time pressure that characterize modern work contribute to sickness absence through prolonged stress exposure and insufficient recovery time (e.g., *31*). According to estimations among European countries, up to 3% of gross domestic product is spent annually on costs related to work-related illness. For example, in 2002, a total of 1.768 EUR per worker was spent on work-related illness in the Netherlands, with about 25% accounted for by prevention costs (*33*). Simultaneously, the workforce is ageing and many governments recently raised the retirement age to keep future retirement pensions affordable. It has therefore become even more imperative to provide sustainable, 'healthy work' (*34*, *35*).

According to Effort-Recovery Theory (*36*), sufficient and timely recovery from work demands and stress is imperative to uphold health (*37*). The balance between effort and recovery is largely determined by workload and autonomy. As WTC allows control over temporal aspects of work, it enables the employee to adjust working times to recovery needs ('WTC as recovery-regulation mechanism'). For example, a self-chosen break may allow temporary relief from work demands and promote recovery during the workday ('internal recovery'), while influence over ending

times of the workday and over overtime promotes sufficient recovery time after work ('external recovery'). This enables timely unwinding from work and prohibits the accumulation of fatigue. By providing employees with possibilities to regulate their effort expenditure and recovery, WTC could alleviate and even prevent the adverse effects of high work demands on health and well-being (*17*, *19*, *38*) and could thus be an effective instrument to support healthy working times, to reduce sickness absence, and to preserve long-term employability.

### 1.3.2. Work-nonwork balance

The past decades have witnessed a rise in the number of dual-earner families, mainly due to increased participation of women in the workforce (*39*, *40*). Therefore, more male and female workers now must combine paid work with household duties and caretaking responsibilities. Combined with high (time) demands at work, this situation increases pressure on employees' time and challenges a proper balance between work and private life (e.g., *41*). Work-home interference ('WHI'; i.e., "when work demands absorb time and/or create strain that makes adequate functioning in the family domain more difficult"; *42*) has been found to negatively impact employees' motivation and energy levels (*43*) and to bear unfavourable consequences for companies (*44*, *45*). EuroFound (*6*) mentions that 14% of European workers worry about work during time off, 21% report being too tired to do household tasks after work, and 11% report that their job prevents them from devoting time to their family 'most of the time' or 'always'.

As WTC can be considered a time-regulation mechanism, it may help employees to reconcile work demands with private obligations, and may thereby reduce time-based WHI. For example, flexible starting and ending times provide the opportunity to drop children off at school before starting work. Indeed, studies suggest that WTC may buffer the effects of long or demanding working hours on WHI (e.g., *42, 46*,

*47*). Concurringly, WTC has been repeatedly suggested as a means to improve employees' work-nonwork balance (e.g., *8*, *48*).

### 1.3.3. Employees' preferences, motivation and productivity

Facing intensified international competition, quickly changing markets and high customer demands, organizations seek to recruit and retain a skilled and committed workforce to uphold a competitive position (*3*). This presupposes a motivating and attractive work content, and circumstances that accommodate the needs and preferences of a diverse workforce, and stimulate commitment and innovation (e.g., *22*, *29*).

Numerous occupational health theories point at the critical role of autonomy in promoting employee motivation, commitment and work satisfaction. Self-determination theory states that autonomy is among the core requirements for the proliferation of intrinsic motivation and well-being (*50-52*). Other central models in occupational psychology (e.g., job-characteristics model [*53*] and the demand-control model [*54*]) pose that autonomy helps employees to deal effectively with situational demands such as high work load or long working hours, and thereby helps to reduce stress and to promote motivation or job satisfaction. As WTC is a form of job autonomy, in line with these theories, it can be expected to foster work motivation, job satisfaction and productivity. WTC could thereby contribute to staff retention, business effectiveness and innovation (*22*, *49*).

In sum, WTC can be theorized to favourably impact employee health, vitality and work-nonwork balance through enhanced time and recovery regulation of employees. These benefits, as well as the perception of autonomy in itself, may positively contribute to employees' job satisfaction, motivation and productivity and help organizations to accommodate individual employees' working time needs.

### 1.3.4. Technological development, WTC, and 'New Ways of Working'

An important development that catalyzed the flexibilization of work is the development of modern Information and Communication Technologies (ICTs). Such developments have been twofold. First, with regard to *job content* – at least in the Western world - a substantial shift from blue-collar production work towards work in the service or knowledge sector is taking place (*4*, *55*, *56*). Whereas the conduct of production work often relies on a specific location (e.g., the production plant) and a specific time schedule (i.e., shift work), a large share of service and knowledge work is not necessarily bound to traditional offices or specific work hours. Second, modern ICTs such as laptop-computers, smartphones, intranets (i.e., online infrastructures to access and share information) and teleconferencing, allow communication and information access from any location at any time (*57*, *58*). As such, modern technology has enabled a range of flexible work arrangements including telework (i.e., working from home or other remote locations) and the adoption of employee-oriented flexible work hours, resulting in WTC.

Exemplary of modern flexibility applications are 'New Ways of Working' (NWW), where place and time independent work (i.e., WTC) is combined with extensive use of ICT and performance-based work and management (see Chapter 4). Implementation of NWW is often aimed at maximizing efficiency and innovation and enhancing employees' work-nonwork balance and job satisfaction, while simultaneously realizing cost reductions (e.g., *22*). Although some studies have assessed diverse aspects of NWW in isolation (e.g., focussing on worktime control [e.g., *18*, *59*, *60*], work-related ICT use [*58*], office redesign [*61*] or telework [*62*]), studies that examine the effects of a full NWW implementation (i.e., including the diverse NWW aspects) are limited in scope and number. Moreover, most studies on NWW concern cross-sectional studies and lack causal inferences (notable exceptions are studies on the Results Only Work Environment ('ROWE') intervention, that partly overlaps with the content of NWW; *24*).

In short, while several ongoing societal challenges ask for provision of WTC, the technological means have now become available to implement not only modest forms of WTC but also far-reaching WTC-initiatives. The modern world of work changes rapidly, and many employees in the post-industrial economy already have or will soon have time and/or place independent work. This signifies the need to scientifically research the effects of modest as well as far-reaching WTC-applications on key outcomes, such as work-home interference, fatigue and job motivation.

## 1.4. Contribution and aim of this dissertation

Against this background, the current dissertation aims to examine WTC and its associations with and effects on theoretically relevant outcomes. Based on the discussed occupational health theories discussed above, we identify the following three key outcome-categories: (i) employee health or well-being (e.g., fatigue, stress, general health); (ii) employees' work-nonwork balance (e.g., work-home interference); and (iii) job-related outcomes (e.g., job satisfaction, motivation, performance). This dissertation aims to address several research issues and gaps of knowledge related to the topic of WTC.

### 1.4.1. Research issues

*1 A comprehensive overview of previous WTC-literature*

As yet, various reviews summarized the research on (single subdimensions of) WTC and diverse outcomes. In a meta-analysis, Baltes and colleagues assessed the association between flextime (i.e., one specific form of WTC, namely control over starting and ending times) and job-related outcomes. Their analysis of 27 intervention studies revealed a positive association between this form of WTC and employees' productivity, job satisfaction and reduced absenteeism (*20*).

The meta-analysis by Joyce and colleagues focussed on the association between flextime and health-related outcomes (*63*), and found tentative support for a favourable association. Finally, a meta-analysis by Allen and colleagues addressed the association between WTC and employees' work-nonwork balance. The authors found a favourable association between employees' schedule control availability and employees' work-nonwork balance (*64*). In line with the theory outlined above, these reviews provide support for the assumed positive effects of WTC on various employees' outcomes.

Yet, no definitive or detailed conclusions can be drawn from these meta-analyses for a number of reasons. Notwithstanding their contribution to the field, the aforementioned meta-analyses all had a narrow scope: First, they addressed only effects of flextime or schedule flexibility, thereby disregarding other important subdimensions of WTC (e.g., control over leave, the distribution of work hours, or overtime work). Second, two meta-analyses (*20*, *63*) focussed solely on intervention studies, and did not consider evidence that could be obtained from alternative research designs. The consequence is an incomplete overview of all knowledge on the associations between WTC and outcome variables. Third, none of the meta-analyses provided a comprehensive overview of the major theoretically relevant outcome categories as identified in the literature. Therefore, this dissertation (Chapter 2) includes a systematic and comprehensive review of the WTC literature, examining a full scope of WTC subdimensions, as well as a broad range of theoretically relevant employee outcomes, and including cross-sectional, longitudinal, and intervention studies

### 2 *A comprehensive measurement of WTC*

In addition to the limited scope of the previous reviews, studies on WTC often used limited WTC measurements. First, only few studies measured a full range of specific WTC subdimensions (i.e., control over daily starting and ending times, breaks, leave, distribution of hours over

the workweek, overtime), and many studies applied a global one-item measurement or had a limited focus on one WTC-subdimension such as flextime. As the effects of WTC may differ per WTC subdimension (e.g., control over breaks may mostly improve recovery during worktime ['internal recovery'; *37*], while control over daily starting and ending times may relate more to recovery after work [external recovery] and work-nonwork balance), incorporating a full range of WTC-subdimensions provides the most valid and detailed insight into the prevalence of WTC-subdimensions and the associations between WTC (subdimensions) and diverse outcomes.

Secondly, most studies focus on WTC access alone, and disregard employees' need for- and use of WTC in relation to relevant outcomes. According to person-environment fit models (e.g., *65*, *66*) and literature on work hour preferences (e.g., *67-69*), low WTC access may be hypothesized to be most unfavourable for employees who have a high need for WTC. We coin this a 'negative mismatch': an employee has less access to WTC than he or she would prefer (i.e., need > access). Incorporating employees' WTC preferences could shed more light on the association between WTC and diverse outcomes. Moreover, only few studies assess the association of WTC use and access within the same sample. This impedes a comparison of these two variables' contribution to employee outcomes (although this problem was partly addressed by Allen and colleagues, see *64*). Taken together, it is not yet clear how WTC use and WTC need are associated with employee outcomes, beyond WTC access alone. In this dissertation (Chapter 3), we assess prevalence of employees' access to, need for and use of WTC, as well as WTC mismatch, and incorporate these measures in predicting employees' outcomes.

### *3 High quality intervention studies on modern WTC-interventions*

The third research issue, as also pointed out by previous reviews, is the strong need for high quality intervention studies on the topic of WTC

(e.g., *20*, *63*). Intervention studies are of central importance for drawing conclusions about causality of effects, as well as for demonstrating the applied value of WTC in workplace settings (*70*). Intervention studies on the topic of WTC are especially relevant considering that modern interventions including WTC applications are currently popular in practice (ROWE, NWW, self-scheduling), but received only limited attention in research so far. It is imperative to know whether interventions aimed at increasing WTC actually result in an increment in WTC and in subsequent improvements of work-nonwork balance, health and well-being, and/or job-related outcomes. Moreover, modern WTC interventions appear in many different quantities (from mild flextime to complete boundaryless work) and many qualities (from a one-dimensional intervention aimed only at changing WTC, to a multi-focused intervention including a change in worktime flexibility, work location flexibility, the physical work environment, and the use of ICT). Therefore, a careful description of the exact intervention content, implementation process, and context is crucial for a valid interpretation of the intervention's effects, and enables generalization to other organizational settings (*71*, *72*). To address the need for WTC-related intervention studies, a modern and popular WTC intervention (i.e., its content, context, and process of implementation, as well as its effects) will be studied within the current dissertation. This study examines the implementation and effects of New Ways of Working, which enjoys popularity in current work society but has attracted only limited scientific inquiry so far.

NWW pose a relatively new and far-reaching form of flexibility (including WTC) that has not yet been thoroughly examined. Although implementation of NWW may aim to accomplish, for example, improved work-nonwork balance or job satisfaction, from a more 'gloomy perspective' adverse effects are also conceivable. For instance, NWW may stimulate continuous connectedness to work, which may actually increase work-home interference (*58*), and the NWW-aspect of extensive 'work from home' may result in reduced social support or problems

with team-work (*73*). Moreover, such interventions may result in highly flexible and irregular work hours with reduced predictability (*12*), which may actually increase instead of reduce problems of combining work and family responsibilities. In line with such a gloomy perspective, the meta-analysis by Baltes and colleagues suggested that far-reaching flexibility seemed less beneficial in terms of job-related outcomes such as job satisfaction or productivity (*20*). Since the effects of WTC interventions are strongly contingent on the intervention's exact content, context and process of implementation (*70*, *71*, *74*), and since the potential negative side effects of far-reaching flexibility have not yet been extensively examined, the effects of such WTC interventions so far remain largely unclear.

### *1.4.2. Aims of this dissertation:*

Taking into account the aforementioned assets and limitations of previous research, this dissertation has the following aims (see Table 1.1):

(**i**) To provide a comprehensive overview of recent empirical evidence of the associations between different subdimensions of WTC on the one hand, and indicators of work–non-work balance, health/well-being, and job-related outcomes on the other.

(**ii**) To provide detailed information on employees' access to, need for, and use of various WTC-subdimensions, as well as employees' mismatch between need for- and access to WTC subdimensions, in relation to employees' outcomes.

(**iii**) To assess the effects of a modern WTC intervention (i.e., NWW) on employee outcomes (i.e., work-nonwork balance, health/well-being, and job-related outcomes) by applying a strong intervention design, and by systematically mapping the intervention's content, context and process of implementation.

## 1.5. Dissertation outline

Table 1.1 provides an overview of this dissertation. In the next chapter (Chapter 2), we present a systematic review on the existing literature on WTC and its association with employees' work-nonwork balance, health and well-being, and job-related outcomes. It adds to earlier reviews because it applies a comprehensive operationalization of WTC by (i) studying diverse subdimensions of WTC, (ii) taking into account studies with non-experimental designs, (iii) and incorporating a broad range of theoretically relevant outcomes.

The third chapter covers a questionnaire study that addresses need for-, access to-, and use of several WTC-subdimensions (prevalence as well as associations with employee outcomes) among a large, quasi-representative sample of Dutch shift working and non-shift working employees. Chapter 4 describes an intervention study on New Ways of Working. Attention is being paid to the precise content, process of implementation and context of this intervention as well as its' effects on a broad range of proximal (e.g., level of worktime control) and more distal (e.g., work-home interference, stress, fatigue, performance) outcomes. An overarching discussion of the findings of this dissertation will be presented in chapter 5, along with implications for practice and suggestions for future research.

**Table 1.1.** Overview of the dissertation

| | Research aim | Research question | Chapter # |
|---|---|---|---|
| 1 | To provide a comprehensive overview of recent empirical evidence of the associations between different subdimensions of WTC on the one hand and indicators of work–non-work balance, health/well-being, and job-related outcomes on the other. | How strong is the empirical evidence regarding the association between (subdimensions of) WTC and indicators of work–non-work balance, health/well-being, and job-related outcomes?<br><br>In case of significant associations between (subdimensions of) WTC and these indicators, how strong is the empirical evidence that these associations are causal in nature? | Chapter 2 |
| 2 | To provide detailed information on employees' access to, need for, and use of various WTC-subdimensions, as well as employees' mismatch between need for- and access to WTC subdimensions, in relation to employees' outcomes. | What is the prevalence of WTC need, access, use and mismatch for shift working and non-shift working employees?<br><br>How are WTC mismatch and WTC use related to employees' outcomes? | Chapter 3 |
| 3 | To assess the effects of the modern WTC intervention 'New Ways of Working', by applying a strong intervention design, and by systematically mapping the intervention's content, context and process of implementation. | What are the effects of NWW on employees' control over worktime and workplace, on employees' work hours and work location, and on the psychosocial work environment?<br><br>What are the effects of NWW on employees' outcomes? | Chapter 4 |

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# Chapter 2

## Systematic review on the association between employee worktime control and work-nonwork balance, health and well-being, and job-related outcomes

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Nijp, H. H., Beckers, D. G. J., Geurts, S. A. E., Tucker, P., & Kompier, M. A. J. (2012). Systematic review on the association between employee worktime control and work-non-work balance, health and well-being, and job-related outcomes. *Scandinavian Journal of Work, Environment & Health*, *38*(4), 299-313. doi:10.5271/sjweh.3307

## 2.1. Abstract

The aim of this review was to assess systematically the empirical evidence for associations between employee worktime control (WTC) and work-nonwork balance, health/well-being, and job-related outcomes (e.g., job satisfaction, job performance). A systematic search of empirical studies published between 1995-2011 resulted in 63 relevant papers from 53 studies. Five different categories of WTC measurements were distinguished (global WTC, multidimensional WTC, flextime, leave control, and 'other subdimensions of WTC'). For each WTC category, we examined the strength of evidence for an association with i) work-nonwork balance, ii) health/well-being, and iii) job-related outcomes. We distinguished between cross-sectional, longitudinal, and intervention studies. Evidence strength was assessed based on the number of studies and their convergence in terms of study findings.

(Moderately) strong cross-sectional evidence was found for positive associations between global WTC and both work-nonwork balance and job-related outcomes, whereas no consistent evidence was found regarding health/well-being. Intervention studies on global WTC found moderately strong evidence for a positive causal association with work-nonwork balance, and no or insufficient evidence for health/well-being and job-related outcomes. Limited to moderately strong cross-sectional evidence was found for positive associations between multidimensional WTC and our outcome categories. Moderately strong cross-sectional evidence was found for positive associations between flextime and all outcome categories. The lack of intervention- or longitudinal studies restricts clear causal inferences. This review has shown that there are theoretical and empirical reasons to view worktime control as a promising tool for the maintenance of employees' work-nonwork balance, health and well-being, and job-related outcomes. At the same time, however, the current state of evidence allows only very limited causal inferences to be made regarding the impact of enhanced worktime control.

## 2.2. Introduction

During the past decades, organizations increasingly emphasized work-related flexibility in their organizational practices (*1*). One type of flexibility that has become more common is 'temporal flexibility', i.e. flexibility regarding working times. Initially, flexible worktime arrangements were mainly implemented for the benefit of the organization (e.g., mandatory overtime work and shift-work), but over the years, attention has shifted towards flexible worktime arrangements, such as worktime control (WTC) (*2*), that may benefit both the organization and its' employees. WTC can be defined as "an employee's possibilities of control over the duration, position, and distribution of worktime" (*3*). WTC comes in many forms. Well-known subdimensions include control over (i) starting and ending times of the workday (i.e., flextime), (ii) when to take a break, (iii) when to take vacation or a day off, (iv) the distribution of workdays over the work week, and (v) whether and when to work overtime.

The increasing popularity of WTC can be explained by its' assumed positive effects on employee work-nonwork balance, health and well-being, and performance. For instance, Self-Determination Theory (*4*) and several influential occupational health theories [e.g., Demand-Control Model (*5*), Job Characteristics Model (*6*)] state that job autonomy - of which WTC is a specific subdimension - is a key factor for employee motivation, health, and performance.

At a more fundamental level, we propose two regulatory mechanisms that can explain the hypothesized favourable association between WTC and indicators of health/well-being and performance: a time-regulation mechanism, and a recovery-regulation mechanism. The first mechanism implies that WTC enables workers to align their working times with their responsibilities in private life. Due to this time-regulating quality, WTC may be an excellent buffer against (time-based) work-home interference. Research has shown that a good balance

between work and home results in higher worker energy, motivation, and satisfaction (*7*).

WTC can also be identified as a recovery-regulation mechanism. Occupational health research has highlighted the relevance of sufficient recovery, showing that insufficient recovery is a main mechanism underlying the association between stressful work and adverse health (*8*). According to Effort-Recovery Theory (*9*), the key determinants of the balance between effort and recovery are work load and work control. From a health-perspective, high workload may adversely influence the effort-recovery balance. Work load is to a large extent determined by the amount and complexity of work, but also by temporal aspects of work (working time arrangements), since the number and distribution of work hours determine the duration and intensity of the exposure to work load, as well as the opportunities for recovery (*9*). Work control can be seen as a key factor in preventing worker overload and preserving a favourable effort-recovery balance. Concerning recovery, control of the temporal aspects of work (i.e., WTC) may have an especially important recuperative value (*10*, *11*) as high individual WTC allows workers to stop working before becoming too fatigued (*12*). In this respect, WTC can be a means for internal recovery (i.e., recovery on the job), as it allows employees to take a break when they feel the need to recover. It may also enhance external recovery (in-between working periods) as it allows workers to have control over leave days, overtime work, or starting and ending times of the work day. So in brief, it can be theorized that WTC facilitates recovery opportunities and consequently can be a buffer against high fatigue and stress, and it may also stimulate vitality, work motivation and performance.

Empirical research is necessary to find out whether such assumptions about the favourable impact of WTC on employee work-non work balance, health/well-being, and performance are valid. During the past decades, much scientific research has addressed the trend towards increasingly diverse and flexible working times. This has resulted in a

considerable number of empirical studies exploring the effects of WTC on employee and organizational outcomes. Baltes and colleagues (*13*) conducted a meta-analysis of 27 intervention studies that examined the association between flextime (i.e., control over starting and ending times of the workday) and various organization relevant outcomes. In line with our theoretical assumptions, their meta-analysis showed that an increase in flextime was indeed associated with positive effects on productivity, job satisfaction, satisfaction with work schedule, and absenteeism. More recently, a (partly overlapping) selection of ten intervention studies was included in a high-quality systematic review about the health-effects of flexible work arrangements by Joyce and coworkers (*14*). As regards WTC, this review focused on health effects and included both studies on flextime and on self-scheduling (freedom to schedule one's own work hours). Five intervention studies were included and the authors tentatively concluded that employee WTC has the potential to favourably influence employee health.

Despite these promising findings, broader conclusions about the effects of WTC cannot be drawn from these reviews, as both reviews had a rather specific focus. Baltes and colleagues (*13*) merely focused on the effects of flextime, and the review by Joyce and colleagues (*14*) included only findings on two specific dimensions of WTC. Also, both reviews focused on intervention studies and excluded studies with other study designs. Furthermore, neither review provides a comprehensive overview of the 'outcomes' of WTC, with Joyce and colleagues (*14*) focusing on health effects, and Baltes and colleagues (*13*) on a particular set of job-related outcomes. Finally, with the latter meta-analysis being published more than a decade ago, an updated overview of studies on the association between WTC and job-related outcomes is needed.

So, whilst recognizing the value of these earlier reviews, we decided to conduct a new and broader review with: (i) a more comprehensive operationalization of WTC; (ii) studies with cross-sectional, longitudinal, and intervention designs; and (iii) a broader range of relevant outcome

categories, thus extending the research focus to indicators of work-non work balance, health/well-being, as well as job-related outcomes such as job satisfaction and job performance.

The aim of the current study was therefore to review systematically the recent empirical literature on WTC and to provide a complete overview of the recent empirical evidence of the associations between WTC on the one hand and indicators of work-non work balance, health/well-being, and job-related outcomes on the other. We focused on the impact of 'global WTC' and of specific WTC-categories (e.g., flextime, control over leave time and vacations, and other subdimensions, such as control over overtime). Regarding outcome categories, we focussed on outcomes that are related to the time-regulation and recovery-regulation mechanisms mentioned above: work-nonwork balance, health/well-being, and 'job-related outcomes'.

Specifically, our research questions were:

*RQ 1) How strong is the empirical evidence regarding the association between (categories of)* WTC *and indicators of work-nonwork balance, health/well-being, and job-related outcomes?*

*RQ 2) In case of significant associations between (categories of)* WTC *and these indicators, how strong is the empirical evidence that these associations are causal in nature?*

## 2.3. Method

### 2.3.1. Study selection

A systematic literature search was conducted within the PsycINFO and PubMed databases, the latter also including the Medline database. We confined our search to relevant empirical English language papers published between 1995 and September 2011. We used a set of keywords related to 'worktime control', for example "worktime AND control",

"working schedule AND flexibility", "self-scheduling", and "flextime". A complete overview of the search terms can be found in Appendix 1. These search terms resulted in 2000 hits. In addition, 67 references within an earlier review (*14*), and three references from the authors' worktime control files were checked for inclusion.

The first author scanned the abstracts of these 2070 papers. Papers that did not focus on the association between WTC (and subdimensions of WTC) and indicators of work-nonwork balance, health/well-being, or job-related outcomes were excluded. This first selection round resulted in exclusion of 1829 papers, 241 papers remaining. Three papers could not be retrieved online, and their authors did not respond to requests for full-text papers. Next, the first three authors assessed the relevance of the remaining 238 papers using the following inclusion criteria:

1 *Publication type and research purpose*: Empirical quantitative studies (i.e., assessing statistical associations among WTC and relevant outcome variables).

2 *Study design*: Cross-sectional studies including at least 100 respondents; intervention studies with control-group and pre- and post intervention measurement; and longitudinal studies. For the two latter categories, there was no restriction as to the number of participants.

3 *Sample*: Samples consisting of healthy and working individuals. Atypical samples (e.g. employees with cardiovascular disease) were excluded.

4 *Relevant measure(s) of WTC*: Only studies with measurements of WTC that fitted our definition of WTC ("control over the duration, position, and distribution of worktime" [*3,* p.34]) were included. If only some example items of WTC were reported, the authors of the specific paper were contacted and asked for detailed information on the complete and exact measurement of WTC (papers *15* and *16*). Studies were excluded if the measure of WTC also included other elements

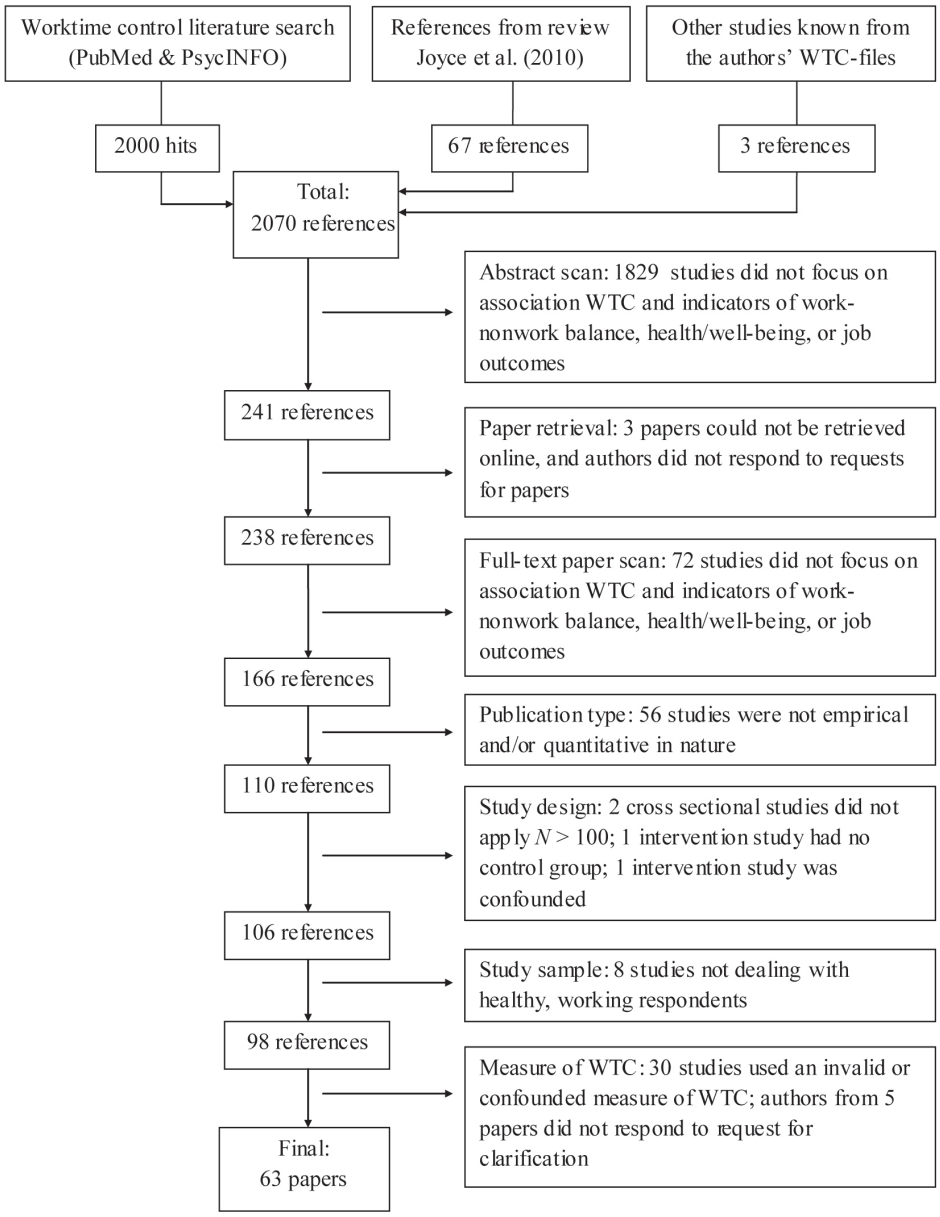


**Figure 2.1.** Systematic Literature Search and Selection of Relevant Papers Regarding the Association between (Categories of) Worktime Control and Indicators of Work-Nonwork Balance, Health/Well-being, and Job-related Outcomes.

(e.g., control over work location; extended workdays, *17*) or was confounded with relevant outcome measures (e.g., "my schedule allows me the flexibility I need to lead a balanced lifestyle", *18*).

Based on these inclusion criteria, the three assessors individually rated each study as either relevant, irrelevant, or undecided. Their ratings converged on 98% of all papers. Twenty-one studies that were considered 'undecided' by at least one of the assessors were discussed in depth until raters agreed upon inclusion or exclusion.

Where multiple papers report on an overlapping dataset, these papers were grouped together and treated as single studies (i.e., the 10-Town study: papers; *19-24*); National Study of the Changing Workforce 1992: *25* & *26*; National Study of the Changing Workforce 2002: *27*, *28* & *29*; European Survey on Working Conditions: *30* & *31*; Results Only Work Environment Study intervention at Best Buy: *32* & *33*). In case multiple papers addressed the same study, the paper numbers are mentioned together, divided by a slash (e.g., "*19/20*").

Based on this procedure, 63 papers were included in the review, representing a total of 53 studies (see Figure 2.1 [based on *34*] for an overview of the number of included papers after each 'inclusion criterion'-step). A complete list of all 238 papers with information on arguments for exclusion or inclusion can be obtained from the first author.

### 2.3.2. Synthesis of evidence

As the 53 selected studies showed considerable heterogeneity in terms of measurement of WTC, 'outcome variables', and analyses, it was not feasible to conduct a meta-analysis (*14, 35*). To avoid mere 'vote-counting' (*36*), we applied a standardized index of convergence (SIC, *37*) to quantify the evidence for the assumed association between WTC, on the one hand, and work-nonwork balance, health/well-being, and job-

related outcomes on the other. Wielenga-Meijer et al. (*37*) define SIC as:

$$\frac{n[positive] - n[negative]}{n[total]}$$

In this formula, *n[positive]* represents "the number of studies (examining the defined relationship) that reported a significant positive relationship, *n[negative]* represents the number of studies that found a significant negative relationship, and *n[total]* represents the total number of studies (including studies that did not find a significant association) for the defined relationship" (*37,* p. 365). SIC-values thus range from -1 (all included studies show negative associations) to +1 (all included studies show positive associations between WTC and the specific outcome category). A SIC close to zero implies that the studies examining this association reported inconsistent findings or failed to find a positive or a negative association between WTC and the 'outcome variable' of interest (*37*). In short, SIC represents the degree to which findings regarding the association of WTC and a specific outcome category are consistent (degree of consistency).

The combination of these SIC-values and the number of studies among which this convergence was calculated serves as a measure of strength of evidence (*37,* see Table 2.1). As Table 2.1 shows, the strength of evidence for each examined association can be either 'strong' (+++ or ---), 'moderately strong' (++ or --), 'limited' (+ or -), 'inconsistent / no' (o, i.e.: both positive and negative results were found or no significant associations were found), or 'insufficient' (i.e., if less than three studies on the specific association were conducted; *37*).

**Table 2.1.** Strength of Evidence for the Associations Studied in this Review, Based on the Number of Studies that Assessed each Association and the Corresponding SICs

| | SIC-value | | | | |
|---|---|---|---|---|---|
| **Number of studies** | **-1.00 to -0.60** | **-0.59 to -0.30** | **-0.29 to 0.29** | **0.30 to 0.59** | **0.60 to 1.00** |
| 1-2 | Insufficient evidence | | | | |
| 3-5 | - - | - | 0 | + | + + |
| ≥ 6 | - - - | - - | 0 | + + | + + + |

*Note.* 0 = inconsistent evidence or no evidence, +(-) = limited evidence for a positive (negative) association; ++(--) = moderately strong evidence for a positive (negative) association; +++(---) = strong evidence for a positive (negative) association (18).

In cases where different measures of the same outcome category were assessed *within one study (*e.g., both stress and sickness absence as indicators of health and well-being within one study), we summarized the findings of the associations among WTC and these different measures into a single rating (see Figure 2.2 for our decision rules regarding the calculation of the single rating). Similarly, when the same association was assessed for different samples *within one study*, the same decision tree (see Figure 2.2, but with samples rather than measures) was followed to develop one single rating. This single rating can either be positive, negative or zero. The rating can then be included in the SIC formula to extract the strength of evidence for the association between WTC and this outcome category.

In cases where one association was tested by multiple analyses, we gave priority to the most advanced statistical test (e.g., regression analyses were given priority over correlations, and regression models with more control variables were given priority over more simple models) in assessing evidence for associations. As we were interested in main effects of WTC, interaction analyses were not considered.

In one study (*38*), the authors reported measurement of relevant outcome-variables but provided no test statistics for some of the potential associations with WTC. We interpreted the absence of reported results as support for a non-significant finding. In two other studies (*39*, *40*), authors interpreted marginally significant associations

(p > .05) as meaningful effects. In this review, we retained an alpha-level of .05 for distinguishing significant versus insignificant findings, and marginal effects or associations were therefore considered as null-findings.

Based on these decision rules, the first author rated all reported associations as either positive, negative or zero. Unclear cases were discussed with three other authors.

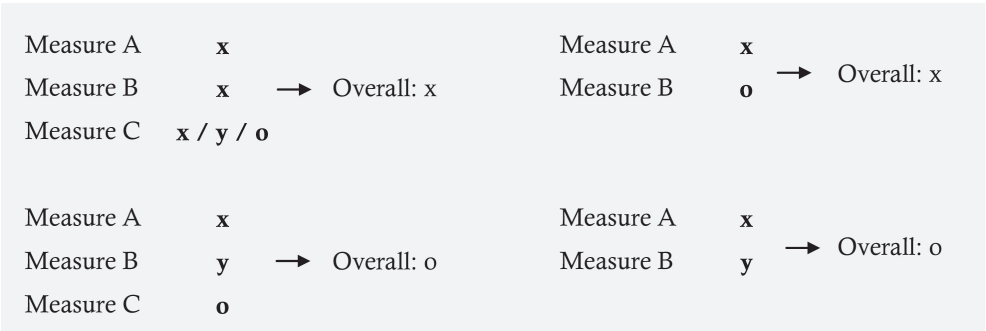


**Figure 2.2.** Decision rules regarding the calculation of a single rating based on different measures of the same outcome-variable within one study.

*Note.* 'x' represents a positive or negative association; 'y' represents an association that contradicts 'x'; 'o' represents 'no association'. The same decision tree applies in case one study examines one association among different samples (instead of measures).

### 2.3.3. Categories of worktime control

The 63 papers showed a wide diversity of measures of WTC; we identified five main categories.

In the first category, 31 papers assessed WTC in a global way, i.e., from the question(s) asked, it could not be determined what specific form of WTC was exercised at the job. Example items included "In general, how much control do you have in deciding when you perform your job?" and "To what extent do you have control over scheduling your working hours?". In the current review, these studies were categorized as studies of 'global WTC' (*15*, *25-29*, *32*, *33*, *38*, *40-61*).

In the second category, 13 papers assessed multiple specific subdimensions of WTC (e.g.: control over breaks, starting and ending times, days off, vacation, etc.), but then summed or averaged the scores of these various questions into one overall score of WTC. In this review, these papers comprised the category of studies on 'multidimensional WTC' (*16*, *19*, *20*, *21, 24, 30, 31, 39, 62-66*).

The remaining studies examined the association of a specific subdimension of WTC with relevant outcome variables. In our third category, 13 papers focused on control over daily working hours (*22, 23, 67-77*). An example question is: "To what extent are you able to influence the length of a work day, and the starting and ending times of a workday?". We labelled this category 'studies on flextime'.

The fourth category of six papers specifically analyzed control over days off or holidays (*22, 42, 68, 74, 78, 79*). An example question is: "Are you free to decide when to take holidays or a day off?". We defined this category as 'studies on leave control'.

The fifth group of seven papers assessed effects of other subdimensions of WTC, i.e., interruptions during work time for personal matters (*27, 76*), control over overtime (*12*, *66*), breaks (*80, 81*), and a 'flexible working hours and compressed working schedule combination' (*82*). This group of papers will be discussed as the 'other subdimensions of WTC' category.

Some papers (*22, 27, 42, 66, 68, 74, 76*) included measurements of more than one subdimension of WTC without converging these into a single 'multidimensional score'. Instead, these studies linked the separate subdimensions to outcome variables (e.g., paper *68* separately examined the association between flextime and leave control on the one hand and outcome variables on the other). These studies were accordingly included in more than one WTC measurement category[1].

1 Detailed information on the studies within the various worktime control categories and their reported associations with employee outcomes can be found in Tables X1-X5 (online supplement, available at http://www.sjweh.fi; issue nr. 38[4]).

### 2.3.4. Categories of outcome variables

The first category of outcome variables was work-nonwork balance, including work-home interference, work-nonwork conflict, balance, and enrichment. The second category was health/well-being, comprising indicators of stress, burnout, affective well-being (e.g., depression, anxiety), fatigue, sleep, sickness absence, and general health. The third category of outcome variables comprised job-related outcomes: measures of job motivation, satisfaction, performance, and commitment, and actual or intended turnover.

We examined the evidence for relations between WTC and these three outcome categories (work-nonwork balance, health/well-being, and job-related outcomes). When the number of studies was too low to allow for any interpretation of evidence (i.e., no more than two studies per outcome category, see Table 2.1), SICs were not reported (notation: insufficient evidence).

For reasons of consistency, we also reported SIC-values for the category "other subdimensions of WTC". It should be noted that these SIC-values reflect associations with various subdimensions of WTC, and provided little proof of effects of the various individual subdimensions of WTC incorporated within this category.

## 2.4. Results

### 2.4.1. Descriptive information

Detailed characteristics and findings of the 63 retrieved papers are summarized in Tables X1-X5 of the online supplement[1]. Twenty-seven papers covered heterogeneous working populations comprising mixed age, occupations and gender. Of the remaining 36 papers, eleven included predominantly (80% or more: *23, 48, 49, 59*) or exclusively (*15, 38, 39, 42, 46, 50, 64*) female samples. Four studies were predominantly (80% or more: *12, 57*) or exclusively (*40, 66*) male samples. Twenty-seven

papers addressed samples of specific job categories (*16, 32, 33, 38, 40, 43-51, 56-59, 61, 62, 66, 67, 71, 77, 79, 80, 81*). Almost all studies were conducted within the U.S., Europe, or Australia. Studies that cover other countries were scarce (N=4: *52-54, 68*).

Of the 63 included papers, 46 used a cross-sectional design (*12, 15, 16, 25-31, 41, 43-46, 49, 51-63, 65-77, 79-82*) and eleven papers (representing six studies) employed a longitudinal design (*19-24, 39, 42, 47, 64, 78*). Four of these (*39, 47, 64, 78*) reported both cross-sectional and longitudinal data and for these studies we will consider both cross-sectional and longitudinal associations. Finally, seven papers were found that addressed five intervention studies (*32/33, 38, 40, 46/50, 48*). These five intervention studies included pre- and post intervention measurements among an intervention group as well as a control group. They did not use randomization to allocate participants to control and intervention conditions.

All studies used self-report methods for data collection. In addition to individual self-report measures, one paper also assessed WTC on work-unit level (*24*). Furthermore, papers *19-24* (all based on the 10-Town study) also included registered data for assessing certain health variables (sickness absence and disability pension), while one study (*81*) conducted physiotherapeutic examinations to assess musculoskeletal disorders. Two intervention studies supported self-reported health indicators with physiological measures (i.e., of heart rate and blood pressure (*40*) or biomarkers collected from blood samples (*46*)). To assess job-related outcomes, one paper reported registered data on turnover (*33*), while another used both self ratings and peer-ratings to measure employee performance (*65*).

### 2.4.2. Evidence for associations between each worktime control category and outcome categories

Table 2.2 summarizes the findings of this review.

**Table 2.2.** Five Worktime Control Categories and Three Outcome Categories: Associations and Synthesis of Evidence (SIC-values) for cross-sectional studies, intervention studies, and longitudinal studies

| Type of WTC | Work-nonwork Balance | Health/ Well-being | Job-related Outcomes |
|---|---|---|---|
| Global | CS:<br>15(+), 25/26(+), 27/28/29(+), 41(+) 42(+) 43(0), 44(+),45(0), 47(+), 51(+), 53(0), 54(+), 56(0), 58(+), 60(0), 61(+) | CS:<br>25(+), 27(0), 29(+), 43(0), 49(0), 51(+), 52(0), 53(-),57(+), 60(0), 61(0) | CS:<br>29(+), 47(0), 52(+), 53(+), 55(0), 56(0), 59(0), 61(+) |
| | Intervention:<br>32(+), 46(0), 48(+) | Intervention:<br>38(0), 40(0), 46/50(0), 48(0) | Intervention:<br>33(+), 48(+) |
| | Longitudinal:<br>42(0), 47(0) | | Longitudinal:<br>47(0) |
| | **CS: SIC(n=16)=.69 (+++)**<br>**Interv: SIC(n=3)=.67 (++)** | **CS: SIC(n=11)=.27 (0)**<br>**Interv: SIC(n=4)=.00 (0)** | **CS: SIC(n=8)=.50 (++)** |
| Multi-dimension | CS:<br>62(+), 64(0), 65(+) | CS:<br>30/31(0), 63(+), 65(+), 66(0)<br>Longitudinal:<br>19/20/21/24(+), 64(0) | CS:<br>16(+), 39(0), 65(0)<br>Longitudinal:<br>39(0), 64(0) |
| | **CS: SIC(n=3)=.67 (++)** | **CS: SIC(n=4)=.50 +** | **CS: SIC(n=3)=.33 (+)** |
| Flextime | CS:<br>67(+), 69(+), 71(0), 72(0), 73(+), 74(0), 75(0), 76(0) | CS:<br>68(+), 70(+), 71(0) | CS:<br>67(0), 73(+), 76(+), 77(+) |
| | | Longitudinal:<br>22/23(+) | |
| | **CS: SIC(n=8)=.38 (++)** | **CS: SIC(n=3)=.67 (++)** | **CS: SIC(n=4)=.75 (++)** |
| Leave control | CS:<br>74(+), 78(+) | CS:<br>68(+), 79(0) | |
| | Longitudinal:<br>42(+),78(+) | Longitudinal:<br>22(+) | |
| Other sub-dimensions | CS:<br>27(+), 76(+), 82(+) | CS:<br>12(+), 27(0), 66(0), 80(+), 81(+) | CS:<br>12(+), 76(+), 80(+), 82(+) |
| | **(CS: SIC(n=3)=1.0 (++)** | **(CS: SIC(n=5)=0.6 (++)** | **(CS: SIC(n=4)=1.0 (++)** |

*Note*. Reported are study number and its reported overall association between every type of worktime control (WTC) and the outcome-category under consideration. (+) = favourable association reported; (0)= no association reported. xx/xx (e.g., 17/32) means: both papers report on an overlapping study. Areas marked in grey represent cells with sufficient number and homogeneity of studies for assessing SIC-values.
Regarding evidence strength based on SIC: **0** = no/inconsistent evidence; **+** = limited evidence for a positive association; **++**= moderately strong evidence for a positive association; **+++** = strong evidence for a positive association.
CS = cross sectional study.

### 2.4.3. Global worktime control

#### *Work-nonwork balance*

From the 16 cross-sectional (CS) studies on global WTC (WTC) and work-nonwork balance, eleven reported that global WTC is positively associated with work-nonwork balance (*15*, *25/26*, *27/28/29*, *41, 42, 44*, *47*, *51*, *54*, *58*, *61*), whereas one study reported mixed findings among different samples (*53*), and four studies reported no relation (*43*, *45*, *56*, *60*). These results yielded a SIC(n=16) of 0.69, providing strong evidence for a positive cross-sectional relation between global WTC and work-nonwork balance. Two longitudinal studies (*42* and *47*, the latter of which additionally employed a CS-design) yielded no temporal relations between global WTC and work-nonwork balance (insufficient evidence).

One intervention study (*48*) among mostly female nurses, showed that work-nonwork balance improved after the introduction of higher levels of WTC (i.e. self-scheduling). Another intervention study (*32*) also showed an improved work-nonwork balance after the introduction of increased WTC among white collar workers. A third intervention study (*46*: self-scheduling among female eldercare workers) reported no effects of increased WTC on work-nonwork balance. Together, these intervention studies yielded a SIC(n=3) of 0.67, providing moderately strong evidence that increased WTC results in improved work-nonwork balance.

#### *Health/well-being*

From 11 CS studies on global WTC and health and well-being, four (*25, 29, 51, 57*) reported positive associations (*25*: stress and burnout, affective well-being, and general health; *29*: affective well-being; *51*: stress; *57*: musculoskeletal symptoms). Six CS studies (*27, 43, 49, 52, 60, 61*) reported no association with indicators of health and well-being (*27, 49, 52*: general health; *43*: fatigue and general health measures; *60*: sickness absence; *61*: affective well-being, fatigue and general health). One study (*53*) reported an unfavourable association among employees

from Singapore, but no association among U.S. employees (i.e., with affective well-being). Together, these studies yielded a SIC(n=11) of 0.27, providing inconsistent evidence for a positive association between global WTC and favourable health and well-being indicators.

Two intervention studies among mostly (*48*) or exclusively (*46/50*) female workers in the healthcare sector showed no effects of WTC improvements on health and well-being (*46:* stress; *48*: vitality, stress and general health; *50*: sleep quality). Two intervention studies (*38, 40*) reported significant effects of increased control over working schedules for some indicators of well-being and health, but not for others (*38*: [midwives] decreased tiredness during night shifts but no significant changes on mental stress and mental strain; *40*: [male airline maintenance personnel] significant decrease in blood pressure but no effects on heart rate, sleep-outcomes or general health). Together, these intervention studies yielded a SIC(n=4) of 0.00, providing no clear evidence for effects of increased WTC on health and well-being outcomes.

### *Job-related outcomes*

From eight CS studies on global WTC and job-related outcomes, four (*29, 52, 53, 61*) reported positive associations with job-related outcomes (in all papers: job satisfaction). Four studies (*47, 55, 56, 59*) failed to find an association (*47*: motivation; *55*: job satisfaction; *56*: motivation and job satisfaction; *59*: job commitment). These studies provided a SIC(n=8) of 0.50, indicating moderately strong evidence for a positive association between global WTC and job-related outcomes, more in particular job satisfaction.

Two intervention studies (*33*, among white-collar workers; *48*, among predominantly female nurses) showed a positive impact of increased WTC on job-related outcomes (*33*: both registered and intended turnover; *48*: job satisfaction) (insufficient evidence). A longitudinal

study (*47*) reported no association (i.e., with work engagement; insufficient evidence).

### 2.4.4. Multidimensional worktime control

#### *Work-nonwork balance*

From three CS- studies, two (*62, 65*) reported a positive association between higher multidimensional WTC and work-nonwork balance, whereas one (*64*) failed to find an association. Together these studies yielded a SIC(n=3) of 0.67, providing moderately strong evidence for a positive association between multidimensional WTC and work-nonwork balance.

#### *Health/well-being*

From four CS studies, two (*63, 65*) reported a positive association between multidimensional WTC and health and well-being (*63*: general health; *65*: recovery-related well-being) whereas the other two (*30/31, 66*) reported no association (*30/31*: stress; *66*: affective-well-being, fatigue and general health). These studies yielded a SIC(n=4) of 0.50, thus providing limited evidence for a positive association between multidimensional WTC and health and well-being.

One longitudinal study (*19/20/21/24*) reported positive associations between multidimensional WTC and various health and well-being indicators (i.e., with sickness absence, general health, affective-well-being and risk of disability pension) whereas a second longitudinal study (*64*) reported no association (i.e., with general health; insufficient evidence).

#### *Job-related outcomes*

One CS-study (*16*) reported mixed findings regarding the association between multidimensional WTC and job-related outcomes (i.e., positive association with affective commitment, no association with job satisfaction). Two CS studies (*39, 65*) failed to find any significant association (*39*: job satisfaction; *65*: self- and peer-assessed job performance).Together these studies provided a SIC(n=3) of 0.33, providing limited evidence for a positive association between multidimensional WTC and job-related outcomes.

Two longitudinal studies (*39, 64*) found no association with job-related outcomes (*39*: job satisfaction; *64*: voluntary turnover; insufficient evidence).

### 2.4.5. Flextime

#### *Work-nonwork balance*

Of the eight CS studies that examined the association between flextime and work-nonwork balance, three (*67, 69, 73*) reported a significant positive association between flextime and work-nonwork balance, whereas five studies (*71, 72, 74-76*) reported no significant association. Together, these studies yielded a SIC(n=8) of .38 and provided moderately strong evidence for a positive association between flextime and work-nonwork balance.

#### *Health/well-being*

From three CS studies on flextime and health and well-being, two (*68, 70*) reported a positive association with health and well-being (*68*: affective well-being, sleep, and recovery-related outcomes; *70*: stress symptoms). A third CS study (*71*) reported no association (i.e., with affective- and physical well-being). Together, these CS studies provided moderately strong evidence for a positive association between flextime and health/well-being (SIC(n=3) =.67).

One longitudinal study (*22/23*) showed an association between flextime at baseline and health/well-being at a three- to four-year follow up (i.e., lower sickness absence; insufficient evidence).

#### *Job-related outcomes*

Of four CS studies, two (*76, 77*) reported a positive association between flextime and job-related outcomes (*76*: job satisfaction; *77*: job satisfaction and organizational commitment) while a third CS study (*73*) reported mixed associations with job-related outcomes (i.e., a positive association with job satisfaction, no association with self-rated job performance). One study (*67*) reported no association (i.e., with affective commitment). Together, these studies yielded a SIC(n=4) of .75, providing moderately strong evidence for a positive association between flextime and job-related outcomes.

### 2.4.6. Leave control

#### *Work-nonwork balance*

Two CS studies (*74, 78*) reported a positive association between leave control and work-nonwork balance (insufficient evidence). One of these studies additionally reported a positive longitudinal association between leave control and work-nonwork balance (*78*). A second longitudinal study (*42*) reported a favourable association as well (insufficient evidence).

#### *Health/well-being*

From two CS-studies, one (*68*) reported a positive association with health and well-being (i.e., affective well-being, sleep and recovery-related outcomes), whereas the second (*79*) reported no association (i.e., with affective well-being, sleep-quality, recovery, and general health; insufficient evidence). One longitudinal study (*22*) reported a

positive association between leave control and health and well-being (i.e., sickness absence; insufficient evidence).

#### *Job-related outcomes*

No studies were found that assessed leave control in relation to job-related outcomes.

### 2.4.7. Other subdimensions of worktime control

#### *Work-nonwork balance*

One CS study (*82*) reported a positive link between access to flextime or compressed workweek schedule and work-nonwork balance. Two other CS-studies (*27, 76*) reported a positive association between control over interruptions for personal matters during working hours and work-nonwork balance. Together, these studies yielded a SIC(n=3) of 1.0, providing moderately strong evidence for a positive association between other subdimensions of WTC and work-nonwork balance. However, this result is difficult to interpret, as it does not provide insight into the associations between the individual types of WTC and work-nonwork balance.

#### *Health/well-being*

From two CS studies on control over overtime (*12*, *66*), one reported a favourable association with health and well-being (*12*: lower fatigue), whereas the other found significant associations for some outcomes but not for others (*66*: a positive association with general health, no association with affective well-being or fatigue). Regarding control over breaks, one CS study found a favourable association with health and well-being (*81*: lower musculoskeletal symptoms as assessed by both self-report and medical examination), whereas another CS study found mixed results (*80*: higher general well-being, no association

with musculoskeletal symptoms). For possibilities to interrupt work for personal matters during work hours (*27*), no overall association was found (i.e., with general well-being).

Together, the studies resulted in a SIC(n=5) of .60, representing moderately strong evidence for a positive association between other subdimensions of WTC and health and well-being indicators. Again, this result is hard to interpret, as it does not inform us about associations between health and well-being and specific types of WTC.

#### *Job-related outcomes*

One CS-study (*82*) reported a positive association between access to flextime or compressed workweek schedule and favourable job-related outcomes (i.e., job satisfaction and turnover intention). In addition, favourable job-related outcomes were associated with control over (i) overtime (*12*: job satisfaction), (ii) breaks (*80*: job satisfaction), and (iii) interruptions for personal matters during working hours (*76*: job satisfaction). These studies together provided moderately strong evidence for a favourable association between other subdimensions of WTC and job-related outcomes (SIC(n=4)=1.0). Once more, this result is hard to interpret as it covers various subdimensions of WTC.

## 2.5. Discussion

This systematic review examined current empirical evidence regarding the association between WTC and (i) work-nonwork balance; (ii) health/well-being; and (iii) job-related outcomes, published between 1995 and 2011. A total of 53 studies were included in the review.

*RQ1: How strong is the empirical evidence regarding the association between (categories of) WTC and indicators of work-nonwork balance, health/well-being, and job-related outcomes?*

The strongest and most consistent evidence (ranging from moderately strong to strong) was found for a positive association between WTC and work-nonwork balance. The association was found for both global and multi-dimensional measures of WTC, as well as for flextime. It was observed in both cross-sectional and intervention designs.

Regarding cross-sectional studies on indices of health/well-being, the review showed inconsistent evidence for a positive association with global measures of WTC, limited evidence for positive associations with multidimensional WTC, and moderately strong evidence of positive associations with flextime. The limited number of intervention studies showed no evidence for overall effects of WTC on health/well-being (although it should be noted that significant effects were found for particular individual indicators of health/well-being).

In the analysis of job-related outcomes, results ranged from limited evidence of a positive association with multi-dimensional measures of WTC, up to moderately strong evidence of positive associations with global WTC and flextime. Two intervention studies (*33, 48*) observed positive effects of increased WTC on job-related outcomes, but the number of intervention studies was too low to allow firm conclusions on the effectiveness of WTC on job-related outcomes.

Our analysis of specific subdimensions of WTC identified moderately strong evidence for positive cross-sectional associations between flextime and work-nonwork balance, health/well-being, as well as job-related outcomes. Promising results were also found for other specific subdimensions of WTC (e.g., leave control, control over breaks, and control over overtime). However, the number of studies on any of these specific subdimensions of WTC was too low to provide sufficient evidence for a positive association.

*RQ2: In case of significant associations between (categories of) WTC and these indicators, how strong is the empirical evidence that these associations are causal in nature?*

In order to draw inferences regarding causality, four methodological requirements have to be met: (i) significant associations; (ii) temporal ordering; (iii) theoretical plausibility for the presumed causal relationships; and (iv) exclusion of rival hypotheses (*83*). Only longitudinal and intervention studies meet the second requirement, with the latter providing the strongest opportunity to assess causal associations. Within the current review, three intervention studies (*32, 46, 48*) focused on the association between global measures of WTC and work-nonwork balance, of which two identified a significant positive association, thereby fulfilling requirements (i) and (ii). The significant associations found are consistent with the time-regulation and recovery-regulation mechanisms, and the occupational health theories that were outlined in the introduction. Hence requirements (iii) and (iv) have been fulfilled. Therefore, we conclude there is moderately strong evidence that higher global WTC (i.e., a general increase of WTC [*32*] or introduction of self-scheduling [*46*, *48*]) causes an improvement in work-nonwork balance.

Four intervention studies (*38, 40, 46/50, 48*) focused on the effects of global WTC on several indices of health/well-being. As discussed above, these studies found no evidence for overall effects. However, it must be noted that some specific individual indicators of health/well-being (i.e., tiredness during the nightshift [*38*], blood pressure [*40*]) did positively change as a result of WTC interventions. We therefore tentatively conclude that WTC may have positive causal effects on health/well-being, but more intervention research is needed to examine which specific health/well-being indices are sensitive to changes in WTC.

For all the other associations studied, it was not possible to draw causal inferences, due to insufficient evidence (i.e., a scarcity of intervention studies) or suboptimal research design quality.

### 2.5.1. Strengths and limitations of the review

One of the keys strengths of the current review was its breadth of focus. Firstly, it examined a wide range of operationalizations of WTC, while excluding related but separate constructs such as spatial control (i.e. control over where to work). Secondly, it covered a relatively broad range of study designs, including not only longitudinal and intervention studies, but also cross-sectional designs. While acknowledging the restrictions of cross-sectional designs regarding causal inferences, we would argue that such studies provide valuable information regarding *possible* effects of WTC. Thirdly, the review examined a broad range of theoretically and practically relevant outcome variables. Finally, the review also provided a detailed picture of the associations between specific subdimensions of WTC and several outcomes.

A number of limitations should also be noted. Firstly, some of the observed associations were based on the same dataset and were therefore not independent. For example, some studies identified both cross-sectional and longitudinal associations between WTC and a specific outcome within the same sample (e.g. *39, 47*), and hence the two findings were not independent. Moreover, in some studies (e.g., *27, 65, 71*), the observed associations between WTC and several outcome categories (e.g., work-nonwork balance and health/well-being) were not independent as they were based upon the same sample of respondents. This overlap in data could, in theory, result in an overestimation of the favourable associations with WTC. However, when looking at Table 2.2, it can be seen that several studies with multiple outcome categories showed contrasting findings for work-nonwork balance, health/well-being, and/or job-related outcomes. For instance, one study (*43*) showed positive findings regarding work-nonwork balance and non-significant findings regarding health/well-being. Similar variation in findings over outcome categories was observed within several other studies (e.g., *27, 47, 52, 61, 65*). Moreover, the same picture emerges when looking at studies that examined both cross-sectional and longitudinal

associations within the same dataset. For instance, two studies (*42* and *47*) found significant positive cross-sectional associations between global WTC and work-nonwork balance, but longitudinal associations between these variables within the same dataset were non-significant. Thus it seems unlikely that overlapping data has resulted in a marked overestimation of favourable associations.

A second limitation was that the reviewing process did not take into account the quality of the measurements used in the studies, as to do so would have overly complicated the analysis. Yet, it must be noted that several WTC studies (e.g., *25/26, 42*) included suboptimal one-item or non-validated measurements of the central research constructs (WTC and outcome measures). A multi-dimensional measurement of WTC may be regarded as more valid than a single-item global measure and the same is true of the various outcomes examined. Such crude measures of global WTC are incapable of capturing the complexity of the work situation of employees who, for example, might have high control over certain aspects of their working time (e.g. when to take days off) but no control over their daily work hours (e.g. taking breaks, starting and finish times, overtime). It is also notable that several of the studies (*30/31, 63*) were based on the European Union surveys of working conditions which rely on measures that have not been psychometrically validated. Such data also suffer from a number of other potential problems (e.g., cultural differences, issues of translation, labour market differences) which may introduce biases into the findings.

Thirdly, it remains unclear from the review results whether the associations between WTC and the outcomes were independent of, or mediated by, other psychosocial work characteristics. For example, few of the studies took into account (i.e. adjusted for) associations with general job control. Thus we cannot be certain that the observed associations would have held if the effects of WTC had been isolated in these studies, nor can we infer whether WTC directly influenced outcomes or that the effects were mediated by a change in the (psychosocial) work environment.

The fourth and final limitation concerns publication bias in favour of statistically significant findings, which may be more easily published than null findings. Hence the ratio of positive associations to null-effects may be somewhat inflated in the current review. However, it is notable that only one of the 53 studies found significant negative (unfavourable) associations between WTC and the outcomes examined. Thus it may be concluded that high WTC is generally not related to adverse employee outcomes.

### 2.5.2. Recommendations for future research: A research agenda

On the basis of our findings, we consider the topic of WTC to be fruitful ground for at least another decade of research. More research is needed to draw definite conclusions about the causal influence of WTC on relevant outcomes (i.e., work-nonwork balance, well-being/health, and job-related outcomes). We propose three recommendations that may guide future research on this topic.

Firstly, we recommend that researchers not only examine the effects of general (global / multidimensional) WTC, but also examine the effects of the specific subdimensions of WTC (flextime, leave control, break control, control over overtime), to determine which subdimensions are most strongly related to which types of outcome variable. It can be hypothesized that some subdimensions mainly work at the level of the recovery regulation mechanism (e.g., control over breaks) and will therefore be chiefly related to recovery-related outcomes (e.g., fatigue and vitality). Other subdimensions may function at the level of the time regulation mechanism (e.g., flextime) and may therefore primarily affect indices of work-nonwork balance. Finally, some subdimensions may affect outcomes through both regulation mechanisms (e.g., leave control and control over overtime) and may therefore affect a broader spectrum of outcome variables. A broad measurement of all subdimensions of WTC is also relevant since the effects of a single subdimension (e.g. leave control) may to some extent also depend

on the level of WTC over the other subdimensions. That is, high leave control may not promote a favourable work-nonwork balance or better health if control over other subdimensions of WTC (e.g., control over start and finish times, or overtime) remains limited. As such, a complete measurement of all relevant WTC aspects is recommendable if one wishes to establish a valid insight into separate and combined effects of subdimensions of WTC.

Secondly, the WTC literature would benefit from studies with high quality designs, especially longitudinal and intervention studies, as these designs allow causal inferences to be made. Regarding the focus of future intervention studies, we recommend more attention to be paid to modern WTC practices that are currently popular within organizations, e.g., self-scheduling (also known as self-rostering) and boundaryless work (or 'New Ways of Working'). Self-scheduling is mostly applied in shift work settings and may provide shift workers with more freedom regarding their work schedule. Boundaryless work has recently become popular in office settings among white collar workers. It includes a combination of extensive WTC and spatial flexibility, with employees being able to decide when and where to work. As noted in the review, self-scheduling shows some promising results for work-nonwork balance and job satisfaction (*48*), although there were null-findings for indices of recovery and general health (*38, 40, 46/50, 48*).

Thirdly, many studies relied primarily on self-reports to collect data on WTC and several outcome measures. Spector (*84*) has shown that reliance on self-reports does not necessarily result in problems of common method bias. Nevertheless, in future studies, it is desirable that researchers also include other data sources (e.g., administrative data on sickness absence, cf. *19-24*) and measures of WTC using multiple assessors (e.g., assessment by the employee and the supervisor; cf. *24*).

A final recommendation is to distinguish between relevant subgroups when examining the effects of WTC. Although WTC is assumed to be universally beneficial, it is likely that employees with greater family

responsibilities (e.g., women) and those with greater need for recovery (e.g., older workers) will gain the most. Women still tend to be primarily responsible for home and family obligations. One study by Ala-Mursula and colleagues (*23*) indicated that providing women with greater levels of WTC helped them maintain favourable health and well-being, even when working relatively long hours. However, it is also worth noting that flexibility could have negative consequences for women. For example, women may end up engaging in more non-work responsibilities, rather than using the increased time control to recover more completely and to lower stress and strain outcomes (*85*).

Many governments are seeking to increase and extend the labour participation of older workers (*86*). WTC may help keep older employees actively involved in the work community while meeting their personal needs for more free time and time for recovery. Older employees may be more willing and able to remain working if they can decide the quantity and distribution of their work hours. Only one of the papers included in the current review examined age as a possible moderator (*30*) in the association between WTC and outcomes, and none of the studies specifically focused on older employees.

In conclusion, this review has shown that there are theoretical and empirical reasons to view WTC as a promising tool for the maintenance of employees' work-nonwork balance, health and well-being, and job-related outcomes. At the same time, however, the current state of evidence allows only very limited causal inferences to be made regarding the impact of enhanced work time control.

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# Chapter 3

## Worktime control access, need and use in relation to work-home interference, fatigue and job motivation

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## 3.1. Abstract

Worktime control (WTC) has been suggested as a tool to reduce employees' work-home interference and fatigue, and to improve job motivation. The purpose of this study was twofold: (i) to examine the prevalence of employees' need for, access to, and use of WTC, as well as the incongruence between need for and access to WTC (i.e., mismatch); and (ii) to examine the associations of this mismatch and the use of WTC with employees' work-home interference (WHI), fatigue and job motivation. Questionnaire data were collected among a large (n = 2,420) quasi-representative sample of Dutch employees. The prevalence of WTC need, access, use and mismatch was assessed by means of descriptive statistics. Associations with employees' 'outcomes' were assessed by analyses of covariance. The need for WTC was highly prevalent. For many employees we observed a negative mismatch between access to and need for WTC (i.e., access < need). A negative WTC mismatch was associated with relatively high levels of WHI and fatigue, and lower job motivation. The use of WTC was also highly prevalent, but no meaningful associations were found with the 'outcome' variables. It is relevant to comprehensively examine WTC, that is, to include measurements of employees' need for and access to WTC, and to assess employees' (mis)match between components of WTC. For practice, we recommend to introduce WTC on an organizational level and to assess employees' need for WTC on an individual level.

## 3.2. Introduction

Demanding working hours and irregular shift work arrangements that characterize modern work are linked to a range of unfavourable outcomes (*1-3*). Several studies suggest that employees' control over working hours (i.e., Worktime control; WTC) may attenuate such negative effects (*4-6*). Employees who report relatively high levels of WTC seem better able to regulate their time demands (i.e. time regulation) and recovery needs (i.e., recovery-regulation), allowing them to combine work and domestic obligations and to manage fatigue by taking sufficient rest (*7*). Additionally, having control over one's working hours meets the basic human need for autonomy (i.e. self-determination), and can have beneficial effects on motivation and well-being (e.g., *8-13*). As such, WTC may be a powerful instrument to help employees in managing high work demands and in combining work and domestic obligations.

A recent review showed that, although many studies found evidence for favourable associations between WTC and work-nonwork balance, health and well-being, and job-related outcomes, there were also inconsistent findings (*14*). We propose three explanations for such inconsistencies. First, the exact measurement of WTC differs strongly among studies (e.g., compare *15-18*). Only a few studies measured a full range of WTC subdimensions (i.e., control over starting- and ending times, leave, breaks, specific working days, the distribution of working hours over the week, and overtime work). These variations in measurements of WTC may impact the associations with potential outcomes. Second, associations of reported WTC and employees' 'outcomes' are likely to depend on employees' need for WTC. It is likely that the fit between access to and need for WTC (i.e., 'WTC match') is more important for potential employees' 'outcomes' than just the reported availability of WTC. Thirdly, it is often unclear whether employees who report to have access to WTC actually use WTC, which could be a prerequisite for beneficial effects to occur (*19, 20*).

Based on these points, it is relevant to adopt a WTC measurement that involves a full range of specific WTC subdimensions, to study employees' need for, access to, and use of WTC, and to pay specific attention to the potential (mis)match between need for and access to WTC [further referred to as 'WTC (mis)match'](*7*). Therefore, the first aim of this paper was to examine the prevalence of (i) various WTC subdimensions, (ii) employees' need for, access to, and use of WTC, and (iii) the WTC mismatch. Our second aim was to examine the relations of WTC mismatch and WTC use with the potential 'outcomes'.

*Aim 1: Prevalence of WTC need, access, use and (mis)match*

Although WTC is becoming more prevalent (*21*, *22*), and modern organizational interventions that incorporate WTC gain popularity (e.g., self-scheduling, *23-27*; boundaryless work, *28-30*), it is still unknown whether access to WTC differs for various WTC subdimensions, and to what extent such WTC subdimensions are needed or used by employees. Additionally, several studies stress the importance of a proper fit between individual needs and working hours of employees (e.g., *24*, *30-35*), but WTC has not yet been researched from such an 'individual match' principle.

Our first research questions are therefore:

*RQ1: What is the prevalence of WTC need, access, and use?*

*RQ2: What is the prevalence of WTC mismatch?*

In answering these questions, prevalences will be reported separately for shift and day workers. The organization of working time differs strongly between shift workers and day workers (*36*), which has been found to influence levels of WTC (*6*). Moreover, various studies have shown that especially shift workers are at risk for adverse health effects as a result of their abnormal working times (e.g., *1, 36-41*).

*Aim 2: WTC in relation to employees' WHI, fatigue and job motivation*

As WTC can be beneficial through different mechanisms (i.e., time-regulation, recovery-regulation and self-determination; *6*), we focus on three 'outcomes' that match these diverse mechanisms: work-home interference (WHI), fatigue, and job motivation (i.e., an employees' willingness to invest sustained and directed effort for accomplishing work; *9,* see also *10*). To examine the associations of WTC mismatch and WTC use with our 'outcome' variables, our next research questions are as follows:

*RQ3: How is WTC mismatch related to employees' WHI, fatigue and job motivation?*

*RQ 4: How is WTC use related to employees' WHI, fatigue and job motivation?*

In line with person-environment fit models (*42*, *43*) and studies on fit between working-time preferences and working hours (*24*, *31-35*), lack of access to WTC is expected to have most unfavourable impact on employees with a high need for WTC. We, therefore, hypothesize that employees with a negative mismatch (need > access) report higher WHI and fatigue and lower job motivation than employees with a WTC match or a positive mismatch (access > need). As favourable effects of WTC are more likely to occur when WTC is actually being applied (*19*, *20*), we expect WTC use to have an additional favourable effect over WTC access alone. Thus, we hypothesize that employees with high use of WTC report lower WHI and fatigue and higher job motivation than employees with low WTC use.

## 3.3. Method

### 3.3.1. Sample and procedure

Data were collected in October/November 2012 through an online questionnaire sent to a large sample of Dutch employees with various occupational backgrounds. The sample was derived from a survey study on work characteristics (National Survey Working conditions, in Dutch: NEA), conducted by the Dutch Organization for Applied Scientific Research (TNO) and the Central Bureau for Statistics Netherlands (*44*) in 2010 (N = 23,788). All respondents who (i) completed the online version of the NEA, and (ii) also agreed to participate in subsequent studies, were contacted for participation in our study (N = 5,504). Reminders were sent two and three weeks after the initial invitation. In total, 2,420 respondents completed the questionnaire (response rate = 44 %). Respondents who were no longer employed at the time of participation in our study (n = 179) were excluded. Also respondents who worked less than twelve contractual hours per week (n = 67) or more than forty-eight (the legal maximum) (n = 4) were excluded. This resulted in a final sample of 2,170 respondents with a fulltime or part-time appointment (43.6% female; $M_{age}$ = 46.06 years; range: 16-67 years). Respondents worked 33.56 contractual hours per week on average (SD = 7.41), and 16.0% (n = 347) worked in shifts. Moreover, 82.1% were married or cohabiting, and 47.6% had children living in the household. Although the current sample was derived from a random selection of Dutch employees, analysis of representativeness (Appendix 2) revealed that highly educated workers were somewhat overrepresented in our study (*44*).

**Table 3.1.** Full Measurement of worktime control need, access and use

| | |
|---|---|
| **WTC Need (*α* = .85)** | |
| To what extent do you have the need to .. | |
| 1 | .. determine the starting and ending times of your working day yourself? |
| 2 | .. determine yourself when to take a break? |
| 3 | .. take leave (day off, holidays) when you want? |
| 4 | .. determine yourself on which days to work? |
| 5 | .. determine the distribution of your working hours over the work week yourself? |
| 6 | .. determine yourself whether to work overtime? |
| **WTC Access (*α* = .88)** | |
| To what extent do you have the possibility to .. | |
| 1[a] | .. determine the starting and ending times of your working day yourself? |
| 2[a] | .. determine yourself when to take a break? |
| 3[a] | .. take leave (day off, holidays) when you want? |
| 4 | .. determine yourself on which days to work? |
| 5 | .. determine the distribution of your working hours over the work week yourself? |
| 6 | .. determine yourself whether to work overtime? |
| **WTC Use[b] (*α* = .74)** | |
| To what extent do you make use of your possibility to .. | |
| 1 | .. determine the starting and ending times of your working day yourself? |
| 2 | .. determine yourself when to take a break? |
| 3 | .. take leave (day off, holidays) when you want? |
| 4 | .. determine yourself on which days to work? |

*Note.* Response scale for all items: 1 = "(Almost) Not at all"; 2 = "To a limited extent"; 3 = "To a reasonable extent"; 4 = "To a high extent"; 5 = "To a very high extent". [a] = Item based on Van Veldhoven and Sluiter (*45*); [b]Having control over whether or not to work overtime (i.e. access) means that employees decide for themselves whether they work overtime or not. Because making any choice between working overtime or not can be regarded as 'use' of control over overtime, use of overtime was not specifically measured. Because (i) use of control over distribution of working hours can be regarded as a combination of use of starting time and ending times and control over which days to work, and because (ii) we wanted to avoid an overly lengthy questionnaire, we did not measure use of control over distribution of working times over the week.

### 3.3.2. Measures

Our worktime control (WTC) measurement included six items on WTC need, six items on WTC access, and four items on WTC use. A complete overview of all items can be found in Table 3.1. Three items on WTC were self-developed, and three items were based on Van Veldhoven and Sluiter (*45*, see Table 3.1).

Items on WTC need and access were presented to all respondents. Items on WTC use were presented conditionally: As WTC access is a prerequisite for WTC use, questions on use for each WTC subdimension were only asked when a respondent first indicated to have access to the corresponding subdimension of WTC, at least to a reasonable extent (score 3 to 5).

Work-home interference (WHI) was measured with six items from the Nijmegen Work-Home Interaction Survey (*46*; Dutch version). We distinguished between three strain-based WHI items (e.g., "How often does it happen that your work obligations make it difficult for you to feel relaxed at home") and three time-based WHI items (e.g., "How often does it happen that your work schedule makes it difficult for you to fulfil your domestic obligations"). Responses were provided on a four–point Likert scale (1 = almost never to 4 = almost always).

Fatigue was measured by a combination of four items from the Fatigue Assessment Scale (*47*) and one item ("In general, I only start to feel relaxed on the second non-working day") from the Questionnaire for Experience and Assessment of Work (Dutch version; *48*). Answers were provided on a five-point Likert scale (1 = almost never to 5 = almost always).

Job motivation was measured by a single item ("How motivated are you with regard to your work?"), with responses being provided on a ten-point Likert scale (1 = "not motivated at all" to 10 = "very much motivated").

Shift work was assessed by asking whether respondents worked (i) shifts or (ii) night shifts ('yes, regularly', 'yes, sometimes', or 'no'). Respondents who answered 'no' to both items were categorized as day workers ($n$ = 1,823), other respondents were categorized as shift workers ($n$ = 347). We included respondents' gender, age, education, children living in the household, cohabiting- or marital status and job sector (dummy coded) as control variables. All scales' Cronbach alpha's were satisfactory to high (see Table 3.2).

### 3.3.3. Statistical Analyses

To analyze the prevalence of WTC need, access, and use (RQ1), means and standard deviations were calculated. Moreover, WTC need, access, and use were dichotomized for each WTC subdimension: Respondents who indicated to need a certain subdimension 'not at all' (score 1) or only 'to a limited degree' (score 2) were categorized as 'low'. Respondents who indicated to need a certain subdimension to a 'reasonable' to 'very strong' degree (score 3 to 5) were categorized as 'high'. The same dichotomization procedure was applied to classify respondents as 'low' versus 'high' regarding access to and use of each WTC-subdimension. Frequency analyses were conducted to examine the prevalence of the various 'high' versus 'low' groups for each WTC subdimension.

To answer RQ2 (prevalence of WTC mismatch), we created a WTC mismatch variable by subtracting respondents' WTC need from his/her WTC access (both ranges: 1 - 5) per WTC subdimension. Values below zero were indicative of a negative mismatch (i.e., WTC need > WTC access), values of zero were indicative of a WTC match (i.e., WTC need = WTC access) and values above zero were indicative of a positive WTC mismatch (i.e., WTC need < WTC access). Frequency analyses were conducted to examine the prevalence of the various (mis)match groups for each WTC subdimension.

Before examining RQ3 (association WTC mismatch and 'outcomes'), we averaged every respondent's mismatch values over all WTC subdimensions. Respondents were then categorized into one of three groups: a positive mismatch group (mean mismatch values ranging from 1 to 4; n = 167), a match group (with mean mismatch values ranging from -0.99 to 0.99; n = 1,332), or a negative mismatch group (with mean mismatch values ranging from -1 to -4; n = 609). For RQ4 (association WTC use and 'outcomes'), we assigned respondents to either a low- (mean WTC use < 3.00; n= 489) or a high (mean WTC use ≥ 3.00; n = 1,295) use group (3 = "reasonable degree of use").

To examine the relationships between WTC mismatch and employees' 'outcomes' (RQ3), we conducted four Analyses of Covariance (ANCOVA) (i.e., for each dependent variable: strain-based WHI, time-based WHI, fatigue, and job motivation) with the three WTC (mis)match groups as between subject factor[1]. The same analyses were conducted to assess the relationship between the two WTC use groups ('low' vs. 'high') and the outcome variables. The control variables (i.e., gender, age, education, marital or cohabiting status, children living in the household and job sector), were included as covariates in all ANCOVA analyses.

## 3.4. Results

Descriptive statistics and correlations among the study variables are presented in Table 3.2. WTC mismatch showed stronger correlations with all four 'outcome' variables than the separate measurements of access to and need for WTC. WTC use was not substantially correlated with any of these 'outcomes'. In general, a more negative mismatch was correlated with higher WHI, higher fatigue and lower job motivation.

1 Because we want to rule out the possibility that the relationships with the 'outcomes' were dependent on our categorization procedure, we replicated the analyses by using regression analyses with WTC mismatch and WTC use as continuous 'predictors'. These additional analyses corroborated our findings (output can be retrieved from the first author). Moreover, ANCOVA analyses with 'broader' and 'narrower' defined match/mismatch groups confirmed our initial findings, indicating that our findings are robust for variations in classification. The categorical approach was preferred for its fit with the first aim of the paper, that is, providing prevalences of WTC access, need, use, and mismatch.

**Table 3.2.** Means and Correlations of Main Study Variables

| Variable | M (SD) | Range | 1. | 2. | 3.[a] | 4. | 5. | 6. | 7. |
|---|---|---|---|---|---|---|---|---|---|
| *Worktime control* | | | | | | | | | |
| 1. WTC need | 3.13 (1.01) | 1 – 5 | .85 | | | | | | |
| 2. WTC access | 2.72 (1.03) | 1 – 5 | .49*** | .88 | | | | | |
| 3. WTC use[a] | 3.30 (0.88) | 1 – 5 | .26*** | .24*** | .74 | | | | |
| 4. WTC mismatch | -0.41 (1.05) | -4 – 4 | .47*** | -.53*** | .05* | .82 | | | |
| *Well-being indicators* | | | | | | | | | |
| 5. Time-based WHI | 1.55 (0.56) | 1 – 4 | .14*** | -.18*** | -.04 | -.31*** | .77 | | |
| 6. Strain-based WHI | 1.59 (0.55) | 1 – 4 | .19*** | -.04 | -.10** | -.21*** | .47*** | .79 | |
| 7. Fatigue | 2.14 (0.80) | 1 – 5 | .12*** | -.18*** | -.07** | -.30*** | .36*** | .56*** | .82 |
| 8. Job motivation | 7.84 (1.34) | 1 - 10 | -.07* | .14*** | .03 | .21*** | -.11*** | -.21*** | -.29*** |

*Note.* N = 2,169; [a] = n for this variable = 1,833; WTC = Worktime control; WTC mismatch was calculated as: 'WTC access' – 'WTC need'. WHI = Work-home interference; Values on diagonal represent Cronbach's α-values. * = p <.05; **= p < .01; *** = p <.001.

### 3.4.1. RQ1: Prevalence of WTC need, access, and use

Figure 3.1 shows frequencies of WTC need, access and use per WTC subdimension for day workers and shift workers, respectively. On average, day workers reported a reasonable WTC need (M = 3.20, SD = 1.01), with a large proportion reporting a reasonable to very high WTC need in general (63.2% with mean score ≥ 3.00). Need for leave control was reported most frequently (88%) among day workers, whereas the need for all other WTC subdimensions was reported by about two-third of the day workers (63.1% to 70.7%).

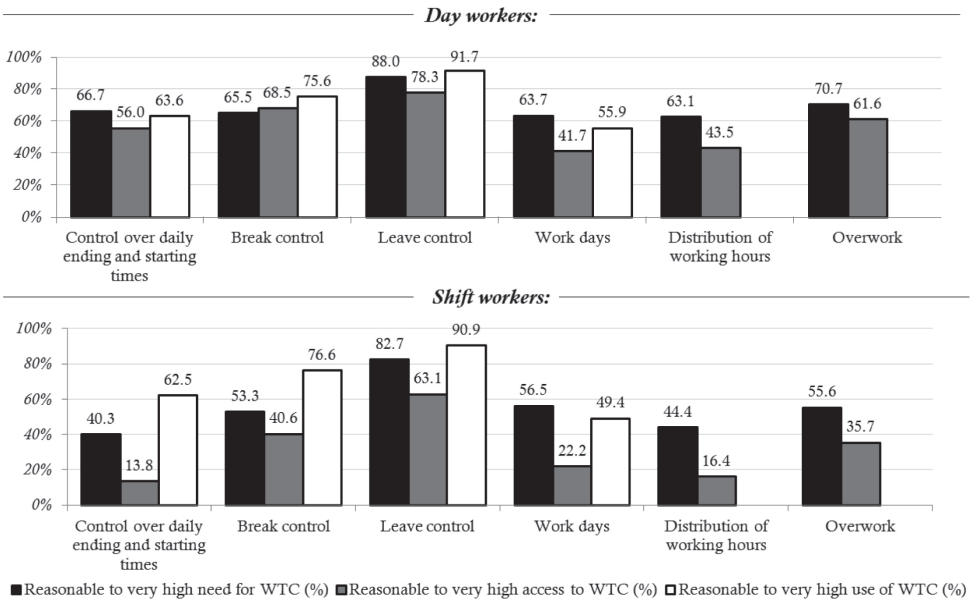


**Figure 3.1.** Prevalence of worktime control (WTC) need, access, and use per WTC Subdimension among day workers (n = 1,823) and shift workers (n = 347).

*Note:* There was one missing response on WTC need (n = 1,822) among day workers. WTC use was assessed only among respondents who had at least reasonable access to the corresponding WTC subdimension (n ranges from 760 to 1,428 for day workers and 48 to 219 for shift workers). Numbers are percentages.

Among shift workers, WTC need was on average less prevalent (M = 2.76, SD = 0.92; 45.5% with mean score ≥ 3.00), but still 40.3 – 82.7% of shift workers had reasonable to very high need for WTC, depending on the specific subdimension. Control over leave was most frequently needed (82.7%), and control over daily starting and ending times least frequently (40.3%).

For both day and shift workers, access to WTC was less prevalent than WTC need. Almost half of day workers had a reasonable to very high WTC access on average (47.4% with mean score ≥ 3.00; M = 2.85; SD = 1.04). The majority of day workers reported limited or no control over which days to work (58.3%), and the distribution of working hours over the week (56.5%). Also substantial proportions of workers reported

limited to no control over starting and ending times of the workday and working overtime (44.0% and 38.4%, respectively).

Among shift workers, prevalence of WTC access was markedly lower as compared to day workers, with only one out of eight shift workers having reasonable to very high access to WTC on average (12.1% with mean score ≥ 3.00; M = 2.07; SD = 0.72). A large majority of shift workers reported limited or no control over starting and ending times, distribution of hours over the work week, and the specific working days (86.2%, 83.6%, and 77.8% respectively).

WTC use was reasonably prevalent among day workers who had WTC access (n = 1,584; M = 3.30; SD = 0.88; 71.9% with mean score ≥ 3.00). Use of WTC was most frequently reported for leave control (91.7%), and least frequently for control over starting- and ending times (63.6%) and control over which days to work (55.9%). This pattern was very similar for shift workers with access to WTC (n = 250; M = 3.33; SD = 0.88; 78.4% with mean score ≥ 3.00).

### 3.4.2. RQ2: Prevalence of WTC (mis-)match

This (mis)match pattern for different WTC-subdimensions was similar among day workers and shift workers (Figure 3.2). For both groups, a negative mismatch (i.e., need > access) was most frequently found for control over leave, over which days to work, and over the distribution of working hours over the work week. A negative mismatch was least prevalent for break control. On almost all WTC subdimensions, a negative mismatch was more prevalent than either a match or a positive mismatch. Overall, a negative mismatch was more prevalent among shift workers (M = 50.2%) as compared to day workers (M = 41.1%).

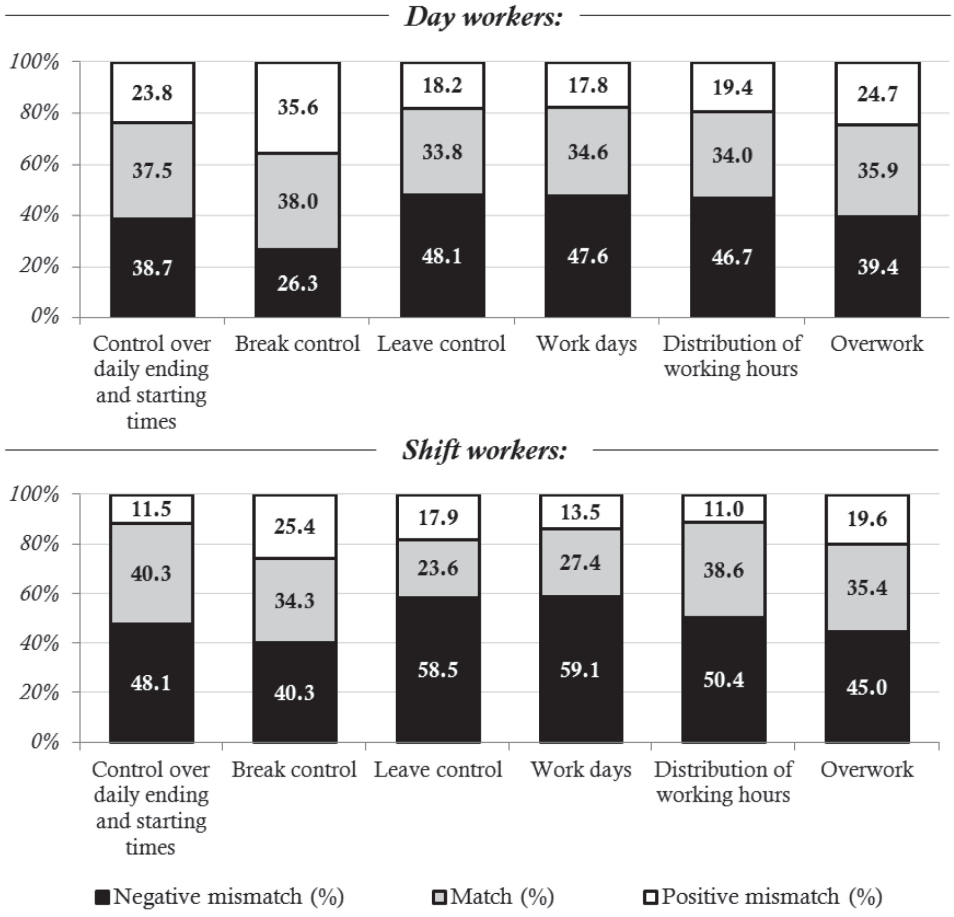


**Figure 3.2.** Prevalence of worktime control (WTC) mismatch per subdimension of WTC among day workers (n = 1,822) and shift workers (n = 347).

*Note:* Mismatch was calculated as "WTC access – WTC need"; Negative mismatch: WTC need > WTC access; Match: WTC need = WTC access; Positive mismatch: WTC need < WTC access. Numbers are percentages.

### 3.4.3. RQ3: WTC mismatch in relation to 'outcomes'

ANCOVA analyses showed significant differences between the three WTC (mis)match groups on the four 'outcome' variables (Table 3.3). Respondents in the negative mismatch group reported higher strain-based WHI (M = 1.76), higher time-based WHI (M = 1.78), higher

fatigue (M = 2.46) and lower job motivation (M = 7.49) as compared to respondents in the positive mismatch group (with M = 1.50, 1.35, 1.94, and 8.14 respectively) or a the match group (with M = 1.53, 1.46, 2.02, and 7.98 respectively). These results are consistent with hypothesis 1. Effect sizes were small to medium (all partial $\eta^2 \leq .08$; see Table 3.3).

**Table 3.3.** 'Outcome' variables as a function of worktime control (WTC) mismatch (ANCOVA)

| | Means per group | | | F (2, 2091) | Partial Eta squared |
|---|---|---|---|---|---|
| | (1) Positive mismatch (need < access) (n = 167) | (2) 'Match' (need ≈ access) (n = 1,332) | (3) Negative mismatch (need > access) (n = 609) | | |
| **Strain-based WHI** (1 – 4) | 1.49[3] | 1.53[3] | 1.76[1,2] | 46.08*** | .04 |
| **Time-based WHI** (1 – 4) | 1.35[2,3] | 1.46[1,3] | 1.78[1,2] | 93.30*** | .08 |
| **Fatigue** (1 – 5) | 1.94[3] | 2.02[3] | 2.46[1,2] | 70.42*** | .06 |
| **Job motivation** (1 – 10) | 8.14[3] | 7.98[3] | 7.49[1,2] | 35.89*** | .03 |

*Note.* Covariates: gender, age, education, marital- or cohabiting status, children living in the household and job sector (dummy coded: crafting, transport, administrative, commercial, services, healthcare, education, specialist, agrarian.[1] = Mean differs significantly from group 1; [2] = Mean differs significantly from group 2; [3] = Mean differs significantly from group 3; Post-hoc analyses: Games-Howell test; Variable ranges between parentheses; Lower sample size results from missing cases on covariates [i.e., 16 implausible responses for age; 46 cases without data on 'marital- or cohabiting status' and 'children living in the household'].
*** = p <.001

### 3.4.4. RQ4: WTC use in relation to 'outcomes'

ANCOVA analyses showed no significant differences between the group 'high' versus 'low' WTC use groups with regard to time-based WHI [F (1, 1768) = 1.25; p = .26], fatigue [F(1, 1768) = 3.30; p = .07], and job motivation [F(1, 1768) = 1.80; p = .18]. Respondents in the 'high' WTC use group only reported significantly lower strain-based WHI (M = 1.54) as compared to respondents in the 'low' WTC use group [M = 1.63; F(1, 1768) = 11.11; p = .001]. However, the proportion of explained variance in strain-based WHI was negligibly small (partial $\eta^2 = .01$). Hence, hypothesis 2 did not receive support.

## 3.5. Discussion

Previous research on WTC merely concentrated on access to WTC without taking into account employees' need for WTC and their actual use of it. In this paper, we studied WTC need and use above and beyond WTC access, and we measured a full range of six WTC subdimensions. We argued that this richer conceptualization of WTC provides a better understanding of its prevalence and of its relation with work-home interference (WHI), fatigue and job motivation.

With regard to prevalence of WTC (aim 1), our results showed that a large majority of Dutch day workers as well as a substantial proportion of shift workers had a reasonable to very high need for WTC.

WTC access was generally less prevalent than WTC need for day, but even more so for shift workers. As a consequence, a negative mismatch between need for and access to WTC was prevalent among day and especially shift workers. When access is provided, a large majority of both day and shift workers make use of WTC.

As hypothesized, employees who were categorized in the negative mismatch group reported somewhat higher WHI and fatigue, and lower job motivation in comparison to employees who were categorized in the match group or positive mismatch group. Whether WTC use was 'high' or 'low' did not make a difference in terms of 'outcome' variables. These results might indicate that having access to WTC is a more decisive factor for WHI, fatigue and job motivation than the actual use of WTC. However, alternative explanations could account for the suggested lacking impact of WTC use on potential 'outcomes', as will be explained below.

### 3.5.1. Theoretical implications

Our finding that employees with a negative mismatch between need for and access to WTC reported higher WHI and fatigue and lower job

motivation than employees with a match or a positive mismatch, is in line with the literature on person-environment fit (e.g., *42*, *43*) that suggests that not so much job characteristics per se, but their congruence with individual needs is decisive for employees´ well-being. Although it has previously been posed that consideration of individual preferences is essential in work-hour research (*24, 31-35*), as yet, such individual preferences have not been studied within the context of worktime control. The current study contributes to theory by demonstrating how individual needs play a role in the association between available WTC opportunities and employees' 'outcomes'.

The use of WTC was not, as we expected, associated with more favourable employee 'outcomes'. However, we cannot conclude from this finding that the use of WTC is not beneficial for workers in terms of WHI, fatigue and job motivation. It might be that the non-users simply have nothing to gain from the use of WTC opportunities in terms of these 'outcomes'. It would be interesting to also consider the 'need to use WTC' in future studies.

The relatively high prevalence of negative WTC mismatch among shift compared to day workers adds to the literature on the unfavourable effects of shift work on employee health. Due to the abnormal working hours, shift work arrangements are related to sleep disorders, fatigue and health problems such as cardiovascular and gastrointestinal disease or cancer (e.g., *1*, *36-41, 49*). Introducing interventions that create some WTC opportunities for shift workers as well, might reduce the large discrepancy between access to and need for WTC among this group. This might be an important step to limit the adverse effects of working hours on shift workers' health.

Our finding that a negative WTC mismatch is more prevalent among shift than day workers implies that WTC is more inherent in some jobs than in others. Although a detailed analysis of job sector or type was beyond the scope of this paper, explorative post-hoc analyses revealed that some job sectors had higher WTC access or need than others.

These effects were small however, and the distinction between shift work versus daywork explains notably more variance in WTC access.

### 3.5.2. Study assets and limitations

This study was the first to provide an overview of employees' need for, access to and use of various WTC subdimensions. Our finding that a negative WTC mismatch between access to and need for WTC is associated with higher WHI and fatigue and lower job motivation supports the necessity of an integrated view on WTC. The current study provides researchers with a comprehensive WTC measurement scale that can be used in future studies that aim for an broad perspective on WTC. Finally, the results were based on a large and heteregeneous sample of Dutch employees, favouring the generalizability of our conclusions.

However, some limitations should be noted as well. First of all, the cross-sectional nature of this study does not allow for any causal inferences. Bidirectionality of some associations under study is plausible though. For example, high levels of fatigue or WHI may increase the need for WTC, which in turn may increase the likelihood of a negative mismatch, especially when access to WTC is limited. Following this reasoning, our 'outcome' variables may have possibly contributed to WTC mismatch. In order to assess the causal direction of associations between the various components of WTC and employees' outcomes, and to find out whether increments in WTC access and use are especially beneficial for workers with a high need for WTC, future intervention studies are strongly needed.

Highly educated employees were somewhat overrepresented in the current study. This may reduce the generalizability of findings. The relatively high education levels, and the associated higher job levels, may have inflated the prevalence of WTC as reported in this paper (*21*, *50*). If so, in reality the proportion of workers with a negative mismatch between access to and need for WTC may be even higher. This adds to the urgency to increase the availability of WTC opportunities.

### 3.5.3. Concluding remarks

This study provided evidence that the majority of day and shift workers in the Netherlands highly need WTC, but that - for many workers - the available WTC opportunities do not match their needs. Such a negative mismatch between need for and access to WTC is related to higher WHI and fatigue, and lower job motivation. Our findings suggest that many workers might benefit from available WTC opportunities, but that simultaneously individual needs for WTC should be taken into consideration. This implies that WTC-interventions on an organizational level, such as boundaryless work (*28-30*) or self-scheduling (e.g., *23-27*), should not be expected to be beneficial for every individual, and that tailor-made implementations based on need assessments might be more effective in terms of employees' work-home balance, energy levels, and motivation (*7*).

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# Chapter 4

## Effects of New Ways of Working on work hours and work location, health and job-related outcomes

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## 4.1. Abstract

New Ways of Working (NWW) is a type of work organisation that is characterized by temporal and spatial flexibility, often combined with extensive use of information and communication technologies (ICT) and performance based management. In a three wave intervention study, we examined the effects of NWW on both the organization of work (changes in control over time and place of work; working hours and work location; and other key job characteristics), and on employees' outcomes (work-nonwork balance; health and well-being; and job-related outcomes). We applied a quasi-experimental design within a large Dutch financial company (N = 2,912). We studied an intervention group (n=2,391) and made comparisons with a reference group (n=521). There were three study waves: i) one/two months before, and ii) 4 months and iii) 10 months after implementation of NWW. Repeated measures analyses of covariance (involving 361 participants from the intervention group and 80 participants from the reference group) showed a large and significant shift from hours worked at the office to hours worked at home after implementation of NWW. Accordingly, commuting time was reduced. Employees remained working on week days and during day time. Psychosocial work-characteristics, work-non work balance, stress, fatigue, and job-related outcomes remained favourable and largely unaffected, but the health score in the intervention group decreased (medium effect). These findings suggest that the implementation of NWW does not necessarily lead to changes in psychosocial work characteristics, well-being or job-related outcomes.

## 4.2. Introduction

Modern technologies heavily impact the organization of work. Information and communication technology (ICT) devices allow many employees to work anywhere, anytime (*1*, *2*). To recruit and retain valuable employees, organizations need to accommodate preferences of a more diverse workforce. These developments have led to a new, more flexible approach in organizing work, i.e. to create time and place independent work environments that aim at innovation and productivity while simultaneously accomplishing cost reductions. This new approach to the organization of work is coined "New Ways of Working" (*3*).

NWW is a type of work organization that is characterized by a combination of temporal and spatial flexibility (e.g., *3*, *4*). Temporal flexibility means that employees, within certain boundaries, can self decide how to distribute their contractual work hours over different times of the day and (seven) days of the week. Spatial flexibility means that employees, again within certain boundaries, have the possibility to perform their work from different workplaces, for example from a flexible office, from home and/or from other remote locations. We define NWW as 'Time and place independent work, often combined with extensive use of ICT and performance based management'. ICT is important for accessing information and communication between employees at various work locations. Steering on performance (clear targets) is important because there is less face to face interaction between supervisors and employees. From this definition it is clear that there is not one type of NWW. Instead NWW comes in many qualities, depending on, for example, the actual boundaries that are set by the company, ergonomic design of workplaces, and availability and utilization of ICT. NWW may also come in many quantities, which may, for example, depend on the number of flexible workstations at the office, or the number of days that employees are stimulated, expected or required to work from home.

According to the 'sunny perspective on NWW', increased autonomy over work could improve employees' motivation (e.g., *5*, *6*) and thereby increase organizational performance. High worktime control can improve the fit between employees' work and private-life (e.g., *7*, *8*) and may allow employees to align their work schedule with their chronotype (*9*). Flexible use of office space and digitalization of information may allow cost reductions and increase work efficiency or information sharing (e.g., *10*, *11*). Working from home is helpful in reducing commuting time, commuting costs and environmental pollution (*12*) and may help employees to combine work and family obligations (*13*).

Other scholars endorse a more 'gloomy perspective'. They point at potential downsides of NWW: loss of social support from colleagues when working from home (*14*), increased stress due to high responsibility, constant connectivity to work and loss of structure (e.g., *1*, *15*). Also long work hours or blurring boundaries between work and private life could compromise work-life balance, recovery from work, and work performance (e.g., *10*, *16*, *17*).

Various studies have been conducted on the effects of separate NWW aspects 'in isolation': studies on telework (e.g., *13*, *18*), worktime control (e.g., *19*), or flexible office designs (e.g., *20*, *21*). Such studies provide little insight in the effects of simultaneous implementation of these NWW aspects (*22*). Moreover, they often do not address the nature (i.e., self-chosen vs. obligatory place and time independent working) and extent of flexibility offered (*13*). Also, they offer little insight into 'process' issues, i.e. into the ways NWW aspects are introduced and implemented. Therefore there is a need to thoroughly examine the effects of NWW as multifaceted intervention on employees' outcomes, such as work-home interference, health and well-being, and job-related outcomes.

Until now, only three intervention studies examined effects of a broad NWW-intervention (*23-25*). All three showed inconsistent effects on health or fatigue and productivity (*23-25*). One study (*23*) showed

indications of increased access to flexible work hours, ICT facilities and remote accessibility of information but also of reduced knowledge-sharing and NWW-consistent management. It showed no effects on collaboration and work satisfaction. These findings suggest that NWW may have positive as well as null or negative effects, and that apart from a focus on more distal outcomes such as health and job-related outcomes it is relevant to examine whether NWW actually leads to presumed changes in the organization of work (i.e., more proximal changes).

The scarce previous research on NWW is not without methodological flaws. Studies either lacked a control group (*23*, *24*), lacked statistical information (*25*), provided limited information on the implementation background, content or process (i.e., 'what really happens'; *26*), included small samples and/or did not test the changes in basic work characteristics that are presumed to change after the intervention (i.e., 'manipulation-check' regarding worktime- and workplace flexibility). Finally, each of these studies focused on a limited number of outcomes of NWW. Such shortcomings prevent firm conclusions on the effects of NWW on the organization of work and on health and well-being.

Despite the increasing popularity of NWW (*27*, *28*), research into its effects is thus still in its infancy. In the current intervention study, we aim to provide a broad overview of the effects of NWW on both the organization of work (i.e., changes in control over time and place of work, working hours and work location, and other job characteristics), and on employees' outcomes (i.e., work-home interference, health and well-being, and job-related outcomes).

### 4.2.1. The current study

In order to provide an overview of the effects of implementing NWW, we conducted a three-wave intervention study within a large Dutch financial company, and assessed a broad range of theoretically relevant outcomes. By closely monitoring the implementation process of NWW,

and by applying a strong intervention design, we aim to address the shortcomings of previous studies. Our first research question is:

*RQ1a. What are the effects of NWW on employees' control over worktime and workplace, and on employees' work hours and work location?*

We expect the implementation of NWW to result in higher levels of worktime control (i.e., employees' possibilities to work *when* they want; WTC) and of work location control (i.e., employees' possibilities to work *where* they want; WLC). Higher levels of such control could lead to higher satisfaction with- and use of WTC and WLC (*8*). In line with this, we expect NWW to result in more time spent working at home, a decrease in time spent at the office, and a reduction in commuting time. Increased flexibility in working times could also lead to more time spent working in the evening or weekend. We also want to find out whether NWW influences the number of weekly work hours.

*RQ1b. What are the effects of NWW on the psychosocial work environment?*

The effects of NWW on the more general psychosocial job characteristics (i.e., general autonomy, work demands and social support) are difficult to predict. For example, increased use of ICT stimulates communications among colleagues (*10*), but working from home may also reduce informal face-to-face meetings. Performance-based management may raise work demands, but use of ICT devices could help to perform work more efficiently. In the absence of clear theoretical indications, we do not formulate specific expectations with regards to RQ1b.

Our second research question is:

*RQ2. What are the effects of NWW on employees' work-home interference, health and well-being, and job-related outcomes?*

If the implementation of NWW impacts the organization of work (RQ1a and 1b), it could also have consequences for i) employees' work-home interference (WHI), ii) health and well-being (in this study: stress, fatigue, and general health), and iii) job-related outcomes (i.e., organizational commitment, performance and job satisfaction). Because the effects

of NWW on the organization of work (RQ1) are yet largely unknown, and because both beneficial as well as detrimental effects of NWW on employees' outcomes are plausible, we do not formulate specific expectations for these three sets of outcomes.

## 4.3. Method

### 4.3.1. Intervention

#### *Objectives*

This intervention study was conducted within a large, Dutch financial and insurance company. The company's overall aim was (i) to improve organizational efficiency by reducing costs and improving productivity, and (ii) to raise employee and customers' satisfaction with work. The company hoped to improve employees' job satisfaction and their work-nonwork-balance, to reduce stress and sickness absence, and to improve performance. The digitalization of information (i.e., paperless office) and intended reduction in daily commuting were supposed to benefit the environment, and consequently the organization's imago. At the same time, with employees working from home for a substantial proportion of time, the organization aimed to reduce costs related to office rent, electricity, cleaning, parking space and commuting. Digitalization of work was expected to result in lower printing costs. The implementation of NWW was thus meant to be beneficial for both the company and the individual employee.

#### *Implementation background*

The implementation of NWW was authorized and supported by top-management. A multi-disciplinary work group was installed as 'motor', and an external consultancy firm was hired to assist management and this work group. NWW-participation was obligatory for all departments and employees. Several short courses or workshops were offered to

both employees and managers to familiarize them with NWW. Initially, these courses were obligatory, later employees could self decide upon participation. Each employee received a budget of 500 EUR to facilitate such training. As the implementation of NWW was a complex process, implementation occurred group-wise, over a six-year period (i.e., department by department, between 2008 and 2014).

Implementation of NWW started in 2008 with pilot projects at the main office. All other departments followed, involving about 7,000 employees at various office locations throughout the country. Two departments at isolated locations, where implementation of NWW was meant to start later, served as reference group (see Study design).

***Implementation content***

*1 Time and place-independent working*

Before NWW-implementation, employees were expected to be present on weekdays 'on core hours' (between 09:30 and 16:00hrs). They had fixed work desks and departments' heads had a private room. There was no official policy on working from home. Due to the absence of optimal security systems, it was not encouraged to take documents home or to use one's private computer.

After implementation of NWW, employees were not bound to certain work times or work locations, unless the work content did pose restrictions in time or location. The organizations' target was to have 55% of employees working from home (or another remote location) for two days a week. Working from home was officially voluntary, but employees were strongly stimulated to work one or two days from home. They were also expected to work at the office for minimally two days per week. The possibility to work from home was therefore restricted for employees with few (< 24 ) contractual hours. Newcomers were expected to familiarize themselves with work before working

from home. When employees performed poorly, working from home could be retracted.

Employees received ergonomic guidelines for designing their home workstation. They signed a checklist with individualized ergonomic requirements, indicating that they agreed to follow these. They received a bureau chair and a budget of up to EUR 600 every five years to ensure ergonomic standards for working at home. They were compensated for extra home costs such as electricity (20 EUR per month when working from home two days a week). By means of questionnaires, working from home was monitored and tested against the organization's 55% target.

To accommodate place-independent work at the office, the office space was turned into a flexible office where employees no longer had their own work place. The number of available workplaces in the office was adapted according to the 55% home-work target: only sixty workplaces were available for every hundred employees in the NWW office. Managers' offices were transformed into meeting rooms, and the office area provided more open spaces. For every department, a social meeting space was created. Other rooms were arranged to enable concentration or privacy. Lockers were installed for storing personal belongings. Every floor was equipped with a central service corner, such as a multifunctional. A coffee corner was arranged in all office buildings. Finally, the office was painted anew and got new carpets.

For almost all departments in our intervention group (29 out of 37 departments), the offices were furnished with 'recycled' furniture. Six departments received new, ergonomic furniture or a mix, and provided more variability in workplaces. For two departments (n = 146), the NWW status (= new vs. recycled furniture) remained unknown to the researchers. In some cases, office redesign was finished up to six months after the introduction of the other intervention measures.

*2 ICT*

Before the intervention, there was little need for ICT to facilitate more flexibility in working time and work location. As part of NWW, all employees received a "personal standard equipment": a laptop with headset and webcam, and often also a smartphone. Digital ICT applications (e.g., email, chat applications, phone software for laptops) were installed to enable communication and cooperation from remote locations, and meeting rooms were equipped with smart boards and roundtable camera's, to enable virtual meetings. Extensive use of intranet was introduced and training was provided in effective use of new facilities.

*3 Performance-based work and management*

Before implementation of NWW, employees were expected to work at relatively fixed working times ('core hours') and fixed locations. After implementation of NWW, a manager could always ask employees to come to work when this was deemed necessary. Some work thus remained restricted to specific work hours or locations (e.g., employees with customer contacts or cooperating in a project). Performance evaluation now concentrated upon the realization of performance targets. These were agreed upon by supervisor and employee. All employees participated in departmental sessions where these new performance principles were discussed. Employees could participate in courses on taking responsibility, and managers were trained in transferring responsibility to subordinates.

### 4.3.2. Study design

The study had a quasi-experimental longitudinal design (i.e., non-randomized design with intervention and reference conditions). Questionnaires were used to study changes over time within both an intervention group (37 departments) and a reference group where

NWW was not implemented (two departments). For this study, three measurements waves were conducted: One pre-measure (one to two months before implementation of NWW) and two post-measures (at respectively four and ten months after implementation). Questionnaires used in this study were identical for the three waves. To answer our research questions, we tested whether the organization of work (*RQ1*) and employees' outcomes (*RQ2*) changed over time (from pre to post1 and post2), depending on participants' condition (i.e., intervention vs. reference condition). As such, we focused on time x group interaction effects on variables related to the organization of work and employee outcomes as indicators of intervention effects (see 'statistical analysis').

The implementation of NWW was a complex process: implementation occurred group-wise, over a six-year period (i.e., department by department, between 2008 and 2014). As the timing of NWW implementation differed per department, the measurement moments also varied over departments. For the majority of intervention departments, the timing of questionnaires differed somewhat from the reference group (which was measured in June/July 2012 [Pre], January/ February 2013 [Post1], and September 2013 [Post2] – this small shift occurred for practical reasons).

As the researchers had no influence in deciding which departments would participate in NWW or not, randomization of departments in intervention vs. reference groups was not possible. Analyses show that employees from the 'waiting list' reference group were somewhat lower educated and reported somewhat less favourable work conditions and well-being on average at baseline (see Table 4.2 & 4.3). Hence the intervention and reference groups were not fully comparable at the start of the study (see Discussion).

### 4.3.3. Sample and procedure

All employees who participated in the NWW implementation after June 2012 (N = 2,391; 37 departments), along with employees from the

reference group (N = 521, two departments), were invited to participate in this study. The study population covers various occupational groups, ranging from sales-persons, financial or IT-specialists, managers and assistants, to administrative personnel and customer service workers. The company provided the researchers with email addresses, and information about contractual hours, age, gender and leadership position. For all three measurement waves, employees received email invitations to fill out the questionnaire, and managers informed all employees about each measurement one week before this invitation was sent. Confidential treatment of data was guaranteed in the invitation. At each wave, the questionnaire was open for three weeks, and a reminder was sent nine days after the initial invitation. Data collection started in June 2012 and ended in December 2014. By then all 37 departments had implemented NWW, and only the employees of the two reference departments did not work according to NWW.

A total of 1,443 employees participated in the pre-measure of this study (39 departments): 1,232 employees within the intervention group (37 departments), and 210 in the reference group (two departments). Response rates per measure (pre-measure, first follow up and second follow up measure) and per group (intervention/reference) range from 46% (second post-measure) to 52% (baseline-measure) among the intervention group, and from 37% (second post-measure) to 44% (baseline-measure) for the reference group.

Employees who worked less than three days were not allowed to work from home (see 'implementation content'). To ensure sufficient exposure to all elements of the NWW-intervention, we selected employees who, by contract, worked 24 hours or more per week. A number of employees worked for multiple departments, or changed from department in the course of the study. As the status of such employees with regard to NWW was not clear, these employees were excluded from analyses. Of our sample (intervention group and reference group), 63.9% were male, and 10.5% held a leadership position. The mean age was 42.33 years (SD = 10.30), and employees worked on average 35.17 (SD = 4.25) contractual

hours per week at baseline. Response to the pre-measure was not biased in terms of gender, age, contractual hours or managerial status.

Only participants who completed the questionnaires of all three measurement waves were included in our analyses. Finally, additional sample attrition occurred due to study drop-out, changes in the workforce (e.g., turnover, reorganizations, transfer to another department, et cetera) or administrative errors. The remaining sample in our analyses covered 361 and 80 participants for the intervention and reference condition respectively. A complete overview of the sample selection and drop-out is presented in Figure 4.1.

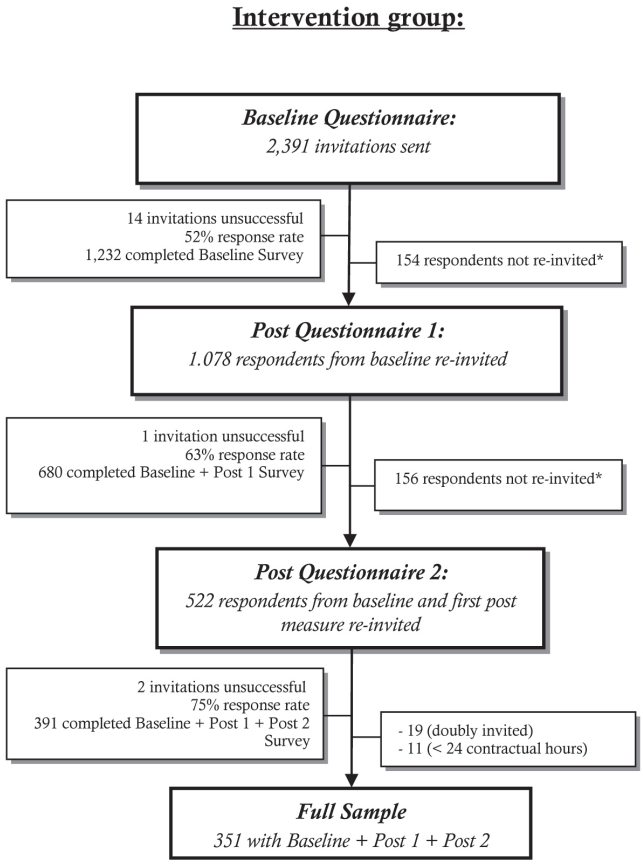


**Figure 4.1** Attrition diagram for intervention and reference groups

Note. *Some participants were not invited again due to study drop-out, changes in the workforce [turnover, reorganizations, transfer to different departments, et cetera] or administrative errors

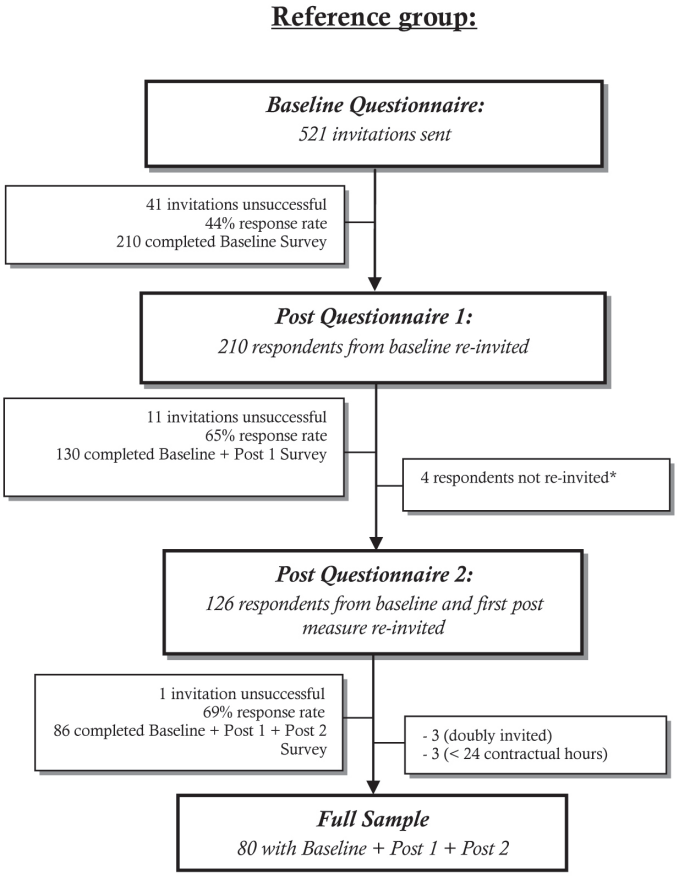


**Figure 4.1** Attrition diagram for intervention and reference groups (continued)

Note. *Some participants were not invited again due to study drop-out, changes in the workforce [turnover, reorganizations, transfer to different departments, et cetera] or administrative errors

### 4.3.4. Measurements

Data-collection was conducted by means of online questionnaires. In every measurement wave, it was emphasized that all questions pertained to the past four months. Scale reliabilities were assessed by Cronbach's Alpha and were all satisfactory to high. Reported Cronbach's Alpha values (α) were calculated at baseline. Reliabilities were highly comparable at all measurement waves.

#### *Measurements regarding Research Question 1a*

Time-independent work was measured by means of questions on *Worktime control (WTC) access, use and satisfaction*. *WTC access* (i.e., employees' possibilities to self-decide when to work) was assessed by seven items, based on Nijp and colleagues (*8*), measuring a broad range of specific WTC subdimensions, i.e., whether employees could (i) control daily starting and ending times, (ii) control when to take a break, (iii) control when to take leave (day off or holiday), (iv) control on which days to work, (v) control the distribution of work hours over the week, (vi) control their own working hours, or (vii) work whenever they wanted (based on Nijp and colleagues; *8*). Answers were provided on a 5-point scale (1 = "[almost] not at all" - 5 = "to a very high extent") and the mean-score of the seven items was used as scale score for WTC-access; $\alpha = .91$).

A single item assessed whether employees made structural *use of such WTC possibilities* (i.e., "do you make structural use of the possibility to determine your work times yourself?"; 1 = yes, I do; 2 = no, I don't; 3 = I don't have such possibilities). Finally, employees were asked to rate on a 10-point scale their *satisfaction with their own say over their work times*; 1 = very dissatisfied; 10 = very satisfied).

Place independent work was measured by means of self-constructed questions on *Work location control (WLC) access, use and satisfaction*. *WLC access* (i.e., employees' possibilities to self-decide where to work)

was assessed by two items: "To what extent can you self-decide where you perform your work?" and "To what extent can you self-decide when to work from home?" (mean score of the two items was used as a scale score for WLC-access; $\alpha$ = .89). *WLC-use* was measured with one item: "Do you make structural use of your possibility to work from home (or some other location than the office)?", and *satisfaction with WLC* was measured with the following item: "Indicate how satisfied you are with the degree to which you have say over your work location (home, the office, or elsewhere)". Response options were similar to WTC measures.

*Work hours*: We asked employees how many hours they worked in total ('total work hours'), contractually ('contractual hours'), during the evening (after 18.00hrs; 'evening hours'), and during the weekend ('weekend hours'), and how many weekly hours they spent commuting ('commuting hours'). To identify the hours spent on different work locations, participants were asked how many hours per week they worked at the office ('office hours') and at home ('home hours'). To assess the temporal distribution of working hours at home, employees were asked how many days they worked from home during weekdays ('weekdays home'), and during the weekend ('weekend days home'). All work-hour items were self-constructed and pertained to hours per week on average during the past four months.

### *Measurements regarding Research question 1b*

We measured job autonomy (4 items; $\alpha$ = .87), job demands (3 items; $\alpha$ = .87), social contact with colleagues (6 items; $\alpha$ = .81) and social contact with supervisors (6 items; $\alpha$ = .89). All items were answered on a four-point scale (1 = 'almost never', to 4 = 'almost always'). Most items stem from the QEEW (*29*). We added one self-constructed item on cooperation with colleagues from a remote location (i.e., "Are there sufficient possibilities to cooperate with your colleagues remotely?") to include the use of new ICT means in our measurement, and one item that assessed face-to-face cooperation ("Are there sufficient possibilities

to cooperate with your colleagues face-to-face?"). In addition, we asked "Do you have sufficient possibilities to learn from your colleagues?" and "Do you feel connected to your colleagues?" to examine additional aspects of social contact that could be impacted by remote work and flexible work locations at the office.

### *Measurements regarding Research Question 2*

*Work-nonwork balance.* We assessed employees' work-home interference (WHI) by means of six items from the SWING (Survey Work-Home Interaction Nijmegen; *30*). We distinguished between time-based WHI (three items, e.g. "How often does it happen that your work schedule makes it difficult for you to fulfill your domestic obligations?"; $\alpha = .71$) and strain-based WHI (three items, e.g. "How often does it happen that your work obligations make it difficult for you to feel relaxed at home?"; $\alpha = .82$). Answers were provided on a 4-point scale (1 = almost never; 4 = almost always). Higher mean scores on the WHI scales indicate higher levels of interference.

*Health/well-being.* Fatigue was measured with three items from the Fatigue Assessment Scale (*31*; i.e.: "I am bothered by fatigue", "I have enough energy for everyday life", "Mentally, I feel exhausted"; $\alpha = .71$). Answers were provided on a 4-point scale (1 = 'almost never' to 4 = 'almost always'). Participants indicated on ten-point scales to what extent they experienced stress as result from their work (1 = very little stress; 10 = very much stress), and how they experienced their health (1 = very bad; 10 = very good).

*Job-related outcomes: Performance, organizational commitment and job satisfaction.* To measure in-role performance, we used four items from Van Dyne and LePine (*32*) (e.g., "I meet my performance expectations"; $\alpha = .89$). Extra-role performance was measured by two items adopted from MacKenzie and colleagues (i.e., "I am always ready to help those around me"; "I take the time to help others at work"; *33*) and one item from Williams and Anderson (*34*; i.e., "I take the time to listen to co-

workers' problems and worries"; $\alpha$ = .88). Three items adapted from Moideenkutty and colleagues (*35*) were used to measure employees' affective organizational commitment (e.g., "I feel a strong sense of belonging to my organization"; $\alpha$ = .81). All items on in-role performance, extra-role performance and commitment were answered on a 7-point response scale (1 = strongly disagree; 7 = strongly agree). Finally, job satisfaction was measured with a single item ("Indicate how satisfied you generally are with your work"; 1 = very dissatisfied; 10 = very satisfied).

### 4.3.5. Data Preparation and Statistical Analyses

When variables were measured by multiple items, scale means were calculated and used in all analyses. For all work hours variables, outlier values (defined as > 3 *SD* above or below the mean; $n$ = 1 to 26, differing per variable) were excluded from analyses.

To test for the effects of the intervention on the continuous outcome variables under study, we conducted repeated measures Analyses of Covariance (RM-ANCOVA) for each quantitative outcome measure (i.e., all variables, except for WLC/WTC use). Condition served as between-subject variable (two levels: intervention vs. reference), and time served as within-subject variable (three levels: pre-measure vs. follow up -measure 1 [four months after implementation of NWW] vs. follow up measure 2 [ten months after implementation of NWW]). Given our research questions, we were mainly interested in time x group interaction effects (i.e., comparing intervention vs. reference groups regarding their changes in study variables over time). These interaction effects were assessed by Greenhouse-Geisser values for significance. In order to further examine the significance and magnitude of the effects of time, within both groups separately, we inspected post-hoc multivariate effects of time and conducted pair-wise comparisons within both the intervention and the reference group separately on each dependent variable.

The effects on categorical outcome variables (use of WTC, use of WLC), were assessed by means of Generalized Estimating Equations (GEE) analyses. As 'use of WTC or WLC' was only relevant to employees with possibilities to use WTC or WLC, respondents who indicated to have no possibilities to use WTC or WLC (i.e., score '3') were excluded from these analyses.

To prevent chance capitalization (due to the large number of dependent variables tested: n = 27), we conservatively defined $p < .01$ as level of significance, whereas $p < .05$ and $> .01$ was regarded marginally significant. Effect sizes ($\eta^2$) were interpreted as follows: 0.01-0.059 = small; 0.059-0.138 = medium; and ≥ 0.138 = large effect (*36*).

Gender, age, education (seven ascending levels), contractual hours and job uncertainty (report mark, 1-10) at baseline were included as covariates in all models.

## 4.4. Results

### 4.4.1. Attrition and selectivity analyses

First, to assess whether response at baseline was selective, we compared respondents who completed this first questionnaire to those who did not on contractual hours, gender, age and leadership position (using objective data from the organization). This analysis showed no signs of selectivity in the intervention sample (see Appendix 3). Among the reference group, employees with fewer contractual hours were less likely to respond to the baseline questionnaire.

Second, to test whether participation in the study after baseline completion was selective, respondents who completed the baseline questionnaire but no follow-up questionnaire were compared to those who filled out both the baseline and at least one follow-up questionnaire (Table 4.1). Respondents who filled out follow-up questionnaires were only marginally older, and reported somewhat higher job autonomy (2.75 versus 2.6). After inspection of effect sizes these differences were

considered irrelevant. Accordingly, there is no reason to conclude that response to follow-up questionnaires was selective in terms of sample characteristics or key study variables.

**Table 4.1.** Selectivity analysis

| | | **Respondents with baseline data only** | | **Respondents with follow-up** | | **Sign. *(p)*** | **Effect size (Partial $\eta^2$)** |
|---|---|---|---|---|---|---|---|
| | | ***n* = 252-253** | | ***n* = 962-977** | | | |
| Variable | Range | *M* | SD | *M* | SD | | |
| Age | | 42.13 | 9.81 | 43.85 | 9.42 | .011 | **.005** |
| [a]Gender male (%) | | 66.1% | / | 61.0% | / | | |
| Education | 1-7 | 4.78 | 1.68 | 4.86 | 1.66 | .533 | .000 |
| WTC_M | 1-5 | 3.10 | .91 | 3.09 | .87 | .848 | .000 |
| WLC_M | 1-5 | 2.69 | 1.11 | 2.59 | 1.16 | .248 | .001 |
| Job demands | 1-4 | 2.43 | .66 | 2.43 | .67 | .974 | .000 |
| Job autonomy | 1-4 | 2.60 | .67 | 2.75 | .66 | **.001** | **.009** |
| Support Colleagues | 1-4 | 3.10 | .51 | 3.06 | .54 | .264 | .001 |
| Stress | 1-10 | 4.84 | 1.96 | 4.82 | 2.02 | .902 | .000 |
| Health | 1-10 | 7.33 | 1.30 | 7.34 | 1.28 | .925 | .000 |
| Job satisfaction | 1-10 | 7.39 | 1.06 | 7.34 | 1.00 | .471 | .001 |
| Job insecurity | 1-10 | 4.75 | 2.42 | 4.90 | 2.52 | .383 | .001 |

*Note*. Data derived from pre-measure. [a]Tested by Chi-Square analysis. All else: Univariate Analysis of Variance. Response samples vary due to missing data.

### 4.4.2. Intervention effects

#### Research question 1a: Effects of NWW on worktime control and work location control, work hours, work location

Results of the analyses on research question 1 are shown in Table 4.2.

*Control over work times and work location.* No significant interaction effects between condition and time were found on WTC access, WTC use or WTC satisfaction. Although significant increments in WTC

access and use were found among the intervention group, similar (but smaller) increments were present in the reference group. Moreover, these effects were all small. Overall, we find no support for an increase in WTC due to implementation of NWW.

Significant interactions between condition and time were found for WLC access, WLC use, and WLC satisfaction. Subsequent analyses show significant, medium and large sized increments in WLC access, WLC use and WLC satisfaction within the intervention group, but no change over time in the reference group. Post-hoc comparisons show a significant increase of WLC-measures after implementation of NWW, but no differences between both post-measures. Hence, the implementation of NWW resulted in increased WLC access, use and satisfaction.

*Work hours and work location.* A significant interaction between group and time indicated changes in total work hours, commuting hours, evening hours, hours worked at the office and hours worked at home (Table 4.2). Follow-up analyses among the intervention group show significant decrements in commuting hours and hours spent at the office, and increments in hours worked in the evening, hours worked at home, and days worked at home during weekdays. Although employees in the intervention group report somewhat longer weekly work hours after implementation of NWW, this effect was small (an increase from 36.06 to 36.56 hours per week). A small decrease in work hours was noted within the reference group. Also the increase in evening hours among the intervention group was only small (from 0.92 hours at baseline, to 1.13 weekly hours at Post 2). Thus, NWW resulted in a shift of working hours from the office to home during weekdays and in shorter commuting time. Other changes were all rather small. This means that generally speaking, NWW-employees work more hours at home, whereas their general working hours pattern remains largely the same, i.e. during weekdays and daytime.

### Research question 1b: Effects of NWW on psychosocial job characteristics

We found significant interactions between condition and time on job demands. Analyses revealed a decrease in job demands in the reference group. No effects of time were found within the intervention group, suggesting that NWW did not impact job demands. As no significant time x group interactions were found for job autonomy and support from colleagues and supervisors, we conclude that NWW did not change the major psychosocial work characteristics, and these remained favourable.

### Research question 2: Effects on employees' outcomes

Results of the analyses on research question 2 (employees' outcomes) are shown in Table 4.3.

*Work-nonwork balance*. Analyses revealed no significant interaction between time and condition on WHI, so the implementation of NWW did not influence work-home interference.

*Health/well-being*. A significant interaction between time and condition was found for health (small effect size). Further inspection reveals a medium-sized decrease in self-reported health (from 7.47 to 7.04) in the intervention group, and no change in the reference group. No consistent pattern was found for stress (no significant effect) or fatigue (only a marginal short-term decrease in fatigue from 1.76 to 1.71 from pre to post 1). Hence the introduction of NWW was accompanied with a medium sized decrease in health, but no noteworthy change in the two other indicators of health and well-being.

*Job-related outcomes*. Small, significant interactions between condition and time were found for organizational commitment, organization perception, and performance. However, these interactions are due to changes in the reference group. No significant changes were found within the intervention group. Hence, the implementation of NWW did not impact employees' job-related outcomes.

### 4.4.3 Comparing short term and midterm effects

Inspection of post-hoc tests (Tables 4.2 and 4.3) show that effects from baseline to the first post-measurement (i.e., short-term effects) are largely comparable to those from baseline to the second post-measurement (i.e., the mid-term effects). Thus, the effects of NWW seem consistent over time.

**Table 4.2.** Effects of NWW on the organization of work: WTC and WLC, work hours and work location

| | | Intervention group (n = 281-359) | | | | |
|---|---|---|---|---|---|---|
| | | | Means | | Effect time | |
| **Variable** | **Range** | **Baseline** | **Post 1** | **Post 2** | ***p*** | **$\eta^2$** |
| WTC/WLC | | | | | | |
| WTC access | 1-5 | 3.14$^{1,2}$ | 3.23$^{0,2}$ | 3.30$^{0,1}$ | **.000** | **.042** |
| WTC use | % use | 57.9%$^{1,2}$ | 68.5%$^{0,2}$ | 74.9%$^{0,1}$ | **.000** | **.073** |
| WTC satisfaction | 1-10 | 7.60$^{ns}$ | 7.75$^{ns}$ | 7.73$^{ns}$ | .143 | .009 |
| WLC access | 1-5 | 2.69 $^{1,2}$ | 3.03$^{0}$ | 3.11$^{0}$ | **.000** | **.131** |
| WLC use | % use | 53.4%$^{1,2}$ | 89.2%$^{0}$ | 90.9%$^{0}$ | **.000** | **.335** |
| WLC satisfaction | 1-10 | 6.55$^{1,2}$ | 7.20$^{0}$ | 7.27$^{0}$ | **.000** | **.087** |
| Work hours/location | | | | | | |
| Work hours | Hours/week | 36.06 $^{1,2}$ | 36.56$^{0,2}$ | 36.54$^{1}$ | **.034** | **.016** |
| Commute hours | Hours/week | 5.79$^{1,2}$ | 4.74$^{0}$ | 4.84$^{0}$ | **.000** | **.123** |
| Evening hours | Hours/week | .92$^{1,2}$ | 1.35$^{0,2}$ | 1.13$^{0,1}$ | **.000** | **.086** |
| Weekend hours | Hours/week | .51$^{2}$ | .59$^{ns}$ | .59$^{0}$ | .089 | .012 |
| Office hours | Hours/week | 30.70$^{1,2}$ | 23.07$^{0,2}$ | 22.48$^{0,1}$ | **.000** | **.542** |
| Home hours | Hours/week | 4.55$^{1,2}$ | 12.54$^{0,2}$ | 12.97$^{0,1}$ | **.000** | **.615** |
| Home days/week | Days/week | .65$^{1,2}$ | 1.51$^{0,2}$ | 1.64$^{0,1}$ | **.000** | **.401** |
| Home days /weekend | Days/weekend | .11$^{ns}$ | .13$^{ns}$ | .15$^{ns}$ | .171 | .011 |
| Job characteristics | | | | | | |
| Job demands | 1 – 4 | 2.30$^{ns}$ | 2.27$^{2}$ | 2.34$^{1}$ | **.035** | **.015** |
| Job autonomy | 1 – 4 | 2.79$^{ns}$ | 2.80$^{ns}$ | 2.78$^{ns}$ | .810 | .001 |
| Support colleagues | 1 – 4 | 3.13$^{ns}$ | 3.13$^{ns}$ | 3.16$^{ns}$ | .470 | .004 |
| Support supervisor | 1 – 4 | 2.84$^{ns}$ | 2.81$^{ns}$ | 2.86$^{ns}$ | .396 | .004 |

Note. Work hour data are trimmed values; $^{0}$ = significantly differs from baseline measure, $^{1}$ = significantly differs from post-measure 1; $^{2}$= significantly differs from post-measure 2; $^{ns}$ = no significant differences from other measures. Intervention effect: p-values and $\eta^2$ based on univariate within-subject test, Greenhouse-Geisser. Within group time effects: multivariate effect of time on estimated marginal means. Age, gender, education, contractual hours and job insecurity at baseline included as covariates. WTC = Worktime control; WLC = Work location control. $^{a}$Wald Chi-Square value [WTC use] = .116; $^{b}$Wald Chi Square value [WLC use] = 31.298. Sample size differs due to exclusion for WTC use or WLC use (if reponse was 'no possibility for use'), or due to exclusion of outliers for work hour variables.

| | Reference group (n = 66-79) | | | | | Intervention effect | |
|---|---|---|---|---|---|---|---|
| | Means | | | Effect time | | (Group*Time) | |
| | **Baseline** | **Post 1** | **Post 2** | ***p*** | **$\eta^2$** | ***p*** | **$\eta^2$** |
| | | | | | | | |
| | 3.12 $^{ns}$ | 3.14 $^{ns}$ | 3.18 $^{ns}$ | .647 | .002 | .509 | .003 |
| | 62.5% $^{2}$ | 64.9% $^{ns}$ | 76.0% $^{0}$ | **.017** | **.024** | .734[a] | - |
| | 7.69 $^{ns}$ | 7.51 $^{2}$ | 7.83 $^{1}$ | .095 | .011 | .079 | .006 |
| | 2.48 $^{ns}$ | 2.51 $^{ns}$ | 2.42 $^{ns}$ | .531 | .003 | **.000** | **.024** |
| | 51.7% $^{ns}$ | 46.2% $^{ns}$ | 50.0% $^{ns}$ | .948 | .000 | **.000**[b] | - |
| | 6.32 $^{ns}$ | 6.41 $^{ns}$ | 6.41 $^{ns}$ | .974 | .000 | .009 | .012 |
| | | | | | | | |
| | 36.35 $^{1,2}$ | 35.36 $^{0}$ | 35.54 $^{0}$ | .060 | .013 | **.004** | **.013** |
| | 5.15 $^{ns}$ | 5.28 $^{ns}$ | 5.47 $^{ns}$ | .711 | .002 | **.004** | **.015** |
| | 1.00 $^{ns}$ | .95 $^{ns}$ | .98 $^{ns}$ | .892 | .001 | **.012** | **.011** |
| | .41 $^{ns}$ | .43 $^{ns}$ | .51 $^{ns}$ | .868 | .001 | .838 | .000 |
| | 31.06 $^{ns}$ | 30.75 $^{ns}$ | 30.72 $^{ns}$ | .966 | .000 | **.000** | **.125** |
| | 5.70 $^{ns}$ | 5.92 $^{ns}$ | 6.29 $^{ns}$ | .971 | .000 | **.000** | **.152** |
| | .69 $^{ns}$ | .83 $^{ns}$ | .79 $^{ns}$ | .572 | .003 | **.000** | **.056** |
| | .12 $^{ns}$ | .10 $^{ns}$ | .14 $^{ns}$ | .539 | .004 | .806 | .001 |
| | | | | | | | |
| | 2.93 $^{1,2}$ | 2.69 $^{0}$ | 2.60 $^{0}$ | **.000** | **.051** | **.000** | **.028** |
| | 2.72 $^{ns}$ | 2.72 $^{ns}$ | 2.72 $^{ns}$ | .955 | .000 | .910 | .000 |
| | 2.80 $^{ns}$ | 2.92 $^{ns}$ | 2.91 $^{ns}$ | .229 | .007 | .288 | .003 |
| | 2.59 $^{ns}$ | 2.73 $^{ns}$ | 2.60 $^{ns}$ | .111 | .010 | .058 | .007 |

**Table 4.3.** Effects of NWW on work-home interference, well-being and job related outcomes

| | | Intervention group (n = 313-361) | | | | |
|---|---|---|---|---|---|---|
| | | Means | | | Effect time[b] | |
| **Variable** | **Range** | **Baseline** | **Post 1** | **Post 2** | ***p*** | **$\eta^2$** |
| Work-nonwork balance | | | | | | |
| WHI [strain] | 1 – 4 | 1.48[ns] | 1.46[2] | 1.51[1] | .096 | .011 |
| WHI [time] | 1 – 4 | 1.42[ns] | 1.38[ns] | 1.41[ns] | .246 | .006 |
| Health/well-being | | | | | | |
| Stress | 1 – 10 | 4.60[ns] | 4.77[ns] | 4.82[ns] | .152 | .009 |
| Fatigue | 1 – 4 | 1.76[1] | 1.71[0,2] | 1.79[1] | **.005** | **.025** |
| Health | 1 – 10 | 7.47[1,2] | 7.16[0] | 7.04[0] | **.000** | **.084** |
| Job-related outcomes | | | | | | |
| Organizational commitment | 1 – 7 | 4.64[ns] | 4.56[ns] | 4.64[ns] | .130 | .009 |
| In-role performance | 1 – 7 | 5.73[ns] | 5.66[ns] | 5.73[ns] | .125 | .010 |
| Extra-role performance | 1 – 7 | 5.86[ns] | 5.81[ns] | 5.81[ns] | .210 | .007 |
| Job Satisfaction | 1 – 10 | 7.43[ns] | 7.37[ns] | 7.37[ns] | .591 | .003 |

Note. [0] = significantly differs from pre-measure, [1] = significantly differs from post-measure 1; [2]= significantly differs from post-measure 2; p values and $\eta^2$: univariate within-subject test, Greenhouse-Geisser. WHI = Work home interference. Age, gender, education, contractual hours and job insecurity at baseline included as covariates. [a]Intervention effect: p-values and $\eta^2$ based on univariate within-subject test, Greenhouse-Geisser. [b]Within group time effects: ultivariate effect of time on estimated marginal means. Sample size differs due to missing values on job satisfaction.

| Reference group (n = 61-79 ) | | | | | Intervention effect | |
|---|---|---|---|---|---|---|
| Means | | | Effect time [b] | | (Group*Time)[a] | |
| **Baseline** | **Post 1** | **Post 2** | ***p*** | **$\eta^2$** | ***p*** | **$\eta^2$** |
| | | | | | | |
| 1.73[ns] | 1.73[ns] | 1.65[ns] | .275 | .006 | .083 | .006 |
| 1.54[1] | 1.40 [0] | 1.44[ns] | .053 | .014 | .204 | .004 |
| | | | | | | |
| 5.54[ns] | 5.30[ns] | 5.38[ns] | .911 | .000 | .505 | .002 |
| 2.12[2] | 2.06[ns] | 2.00[0] | .088 | .011 | **.017** | **.010** |
| 6.97[ns] | 6.91[ns] | 7.05[ns] | .632 | .002 | **.005** | **.012** |
| | | | | | | |
| 4.48[2] | 4.50[2] | 4.30[0,1] | **.046** | **.014** | **.019** | **.009** |
| 5.57[1] | 5.76[0] | 5.59[ns] | .058 | .013 | **.020** | **.009** |
| 5.76[1] | 5.92[0] | 5.84[ns] | **.046** | **.014** | **.037** | **.008** |
| 6.98[1] | 7.15[0] | 7.03[ns] | .514 | .004 | .437 | .002 |

## 4.5. Discussion

New Ways of Working is a type of work organisation that is characterized by time- and place independent work, often combined with extensive use of ICT and performance based management. In a three wave intervention study, we examined the effects of NWW on temporal and spatial aspects of work organization, on other key psychosocial factors, and on employees' outcomes: work-nonwork balance, health and well-being, and job-related outcomes.

Regarding the organization of work, the implementation of NWW resulted in increased access to, use of and satisfaction with work location control. NWW-employees reported more working hours at home and accordingly less office hours and commuting time. Their general working hours pattern remained largely the same: work was still mainly executed during weekdays and daytime. Moreover, NWW did not seem to affect worktime control nor key elements of the psychosocial work environment (demands, control, support/contact). The effects of NWW on employees' outcomes are limited. Our analyses show no changes in work-home interference, suggesting that NWW did not improve nor hinder employees' work-nonwork balance. Despite further null effects on fatigue or stress, a decrease in health was found after the implementation of NWW. No changes were found in employees' performance, organizational commitment or job satisfaction.

Some of these main results deserve further discussion. First, the absence of an increase in worktime control due to NWW and the stable weekly work hours pattern are notable, as temporal flexibility is regarded one of the core aspects of NWW. Before NWW-implementation employees already were generally satisfied with their work time control (7.60 on a 1-10 scale) and reported only little variability and high regularity in work hours (i.e., mostly daywork, few working hours during the evening or weekend, and their working times seemed to meet their preferences). This means that there was not that much room for improvement regarding regularity of working hours or working according to preferred

working times. It is plausible that the majority of employees in this study simply prefers to work on weekdays and during daytime. Including measurements of employees' chronotype or social commitments (e.g., children or care for other family members) in future NWW-studies could shed more light on such working hours preferences.

Second, the increase in work from home and the accompanying decrease in office days was to be expected because employees were strongly encouraged to work one or two days a week at home, and office space was reduced accordingly. However, work from home did not seem to be interpreted as merely mandatory or involuntary, because satisfaction with work location control increased significantly after NWW-implementation. This does imply that, generally speaking, work from home in this NWW-organization can be regarded as a combination of both organization-based and employee-based flexibility.

Third, the stable quality of the psychosocial work environment may be at least partly explained by the fact that employees' job content, i.e. work itself, remained the same. Social support did not change either. This suggests that employees, despite the marked increase in work from home, kept in touch with their colleagues and supervisors. The minimum requirement for full-timers of 'two office days presence a week' may have been helpful in maintaining social cohesion. As such, for full-time employees 'a 50/50-rule' regarding work location (i.e., to be at least 50% of working time at the office) could be advisable to maintain good quality of social and functional relations between employees.

Fourth, despite the increase in work from home, we found no change in work-home interference. Work from home did not hinder, but also did not improve employees' balance between work and the nonwork domain. As work-home interference was already low at baseline (average of 1.45, on 1-4 scale), this stability may reflect a 'floor effect': obviously there was little room for improvement in this sample. The absence of effects on indicators of well-being (fatigue and stress) and performance can be interpreted in a similar vein. Future studies among

samples with less favourable baseline work-home balance-, well-being-, and performance scores may show whether NWW-practices have limited effects on such indicators or that effects will be present when there is more room for improvement.

Finally, self-reported health was the only employee outcome that consistently changed after implementation of NWW. However, the decrease in health should be interpreted with caution, as indicators that usually underlie, precede or accompany health complaints did not change (stress), or rather showed some possible minor improvement (fatigue – small short term effect only). Also potential causal factors such as job demands remained moderate and unchanged. Nevertheless, we recommend this company to further monitor employees' health status.

### 4.5.1. Assets and limitations

An increasing number of organizations has implemented NWW, or is in the process of doing so (*23*, *27*, *28*). This large scale intervention study is among the first to examine the effects of a NWW implementation in a real-life work setting and by means of a thorough intervention design. The study was complex as the implementation of NWW occurred in phases ('department-after-department'), implying that each of the 39 departments had its' own 'implementation-timeline' and accordingly its' own measurement timeline. As a result, it took 2.5 intensive years to collect all data. The study contains an intervention group as well as a reference group and includes longitudinal within-person data from three waves (one pre and two post-measurements), which allows for examination of short and longer term effects of NWW. We believe that another strong point is the measurement of a rich set of theoretically relevant proximal and distal variables (*37*). This enables a comprehensive insight in effects on both work and the worker. We assessed these variables with valid measures, and placed special emphasis on the two central NWW aspects: employees' control over work time and over work location. Following the advice of Nijp and colleagues (*8*) we made

a fine grained distinction between access to-, use of-, and satisfaction with- worktime control and work location control.

Yet, there are several limitations to this study. First, the applied intervention design is not without problems. We were not able to self-select intervention and reference groups (no randomization), but applying a textbook randomized controlled trial is often not feasible in real-life organizations. One of the reasons is that researchers are 'guests and not autocrats' (*38*, *39*). Although with Kristensen (*26*) we do agree that '*a* reference group is better than *no* reference group', our reference group poses problems. First, the intervention group and the reference group differed somewhat on a number of baseline study variables. Second, due to the number of measurement waves and additional naturally occurring drop-out (e.g., due to job changes), there was substantial attrition within the reference group. Thus, the comparison of both groups is imperfect. We have dealt with this problem by combining three perspectives when interpreting the study results: i) the group x time interactions; ii) the time effects in the intervention group; and iii) the prevalence scores, for example baseline levels of the studied variables. With respect to attrition that logically occurs in long time longitudinal studies, we have conducted checks for selection bias. Our selectivity analyses show that within our NWW-group the response to questionnaires was not biased in terms of key study variables (at baseline nor at follow-up measurements). As such, it seems safe to conclude that our intervention group constitutes a valid representation of the total intervention study population.

### 4.5.2. Theoretical implications

When it comes to predicting the potential effects of NWW both 'sunny' and 'gloomy' perspectives prevail. On a more theoretical note it is important to not conceive of NWW as a uni-dimensional phenomenon, nor a simple 'pill'. NWW comes in many qualities, which means that the exact content of NWW may vary importantly among organizations. It

also comes in many quantities. This means that the actual (degree of) of implementation may vary as well. For example, work from home can be either mandatory or voluntary. It may take place on a kitchen chair or on an ergonomic work station, with or without appropriate ICT and performance management. In some NWW-organizations employees may work the majority of their working time from home, in others work from home may be limited to one day a week. Flexible workplaces at the office may be ample (for example 90 work stations for 100 employees) or strict (40 workstations for 100 employees). These work stations may be noisy or enable concentration work, et cetera. Apart from the exact nature (quality and quantity), also the introduction and implementation do matter (*3, 39, 40*). In light of such content-wise, contextual and process considerations, this study's findings cannot simply be generalized to other NWW-interventions and other companies. It is important to conduct and investigate additional natural experiments of NWW to learn more about effects and effect modifiers.

### 4.5.3. Implications for practice

We found no evidence for a 'sunny', nor for a 'gloomy' perspective on NWW. Changes in psychosocial job characteristics were absent, nor were there (un)favourable implications for employees in terms of work-home balance, well-being or performance. As the current study covers one specific organization that implemented one specific form of NWW (among a sample with already favourable work characteristics and favourable outcome measures before implementation of NWW), additional natural experiments are required to enable solid conclusions as to *which* NWW-manifestations, *under which circumstances*, may have which kind of consequences. For now, there is no reason to explicitly encourage or discourage the practical implementation of NWW. We conclude that implementation of NWW does not necessarily lead to changes in psychosocial job characteristics, and that it is possible to implement such a large and far-reaching intervention without

negatively affecting employees' work-nonwork balance, well-being or job-related outcomes.

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# Chapter 5

## General Discussion

## 5.1. Introduction

Today's world of work is characterized by high performance needs and demanding work hours (*1*). In this context, organizations seek ways to ensure a sustainable and healthy work design, and to maximize levels of employee motivation for the attraction and retention of a skilful workforce (*2*, *3*). The increase of dual-earner families asks for tools that promote successful reconciling of work and family life and that enable more efficient time use. Meanwhile, the availability and development of modern information and communication technologies (ICTs) permit more flexibility regarding the organization of work in terms of work hours and work location. This confluence of factors has drawn attention to worktime control (i.e., an employees' possibility to control the duration, position and distribution of worktime; WTC [*4*]) as a potential tool to retain and improve employees' vitality, work-home balance, and work motivation in the demanding world of work. The main objective of this dissertation was to empirically examine the associations and effects of WTC with regard to employees' work-nonwork balance, health and well-being, and job-related outcomes (e.g., job satisfaction, job motivation, or performance). We addressed this main objective by means of three studies that each dealt with important limitations and issues of previous WTC research and thus provided new knowledge on the effects of WTC on theoretically relevant outcomes. These research issues concerned the need for:

**(i)** a comprehensive overview of empirical evidence on the relation between (subdimensions of) WTC and theoretically relevant employee outcomes;

**(ii)** detailed knowledge on employees' access to, need for, and use of various WTC subdimensions, as well as employees' mismatch between need for- and access to WTC subdimensions, in relation to employees' outcomes;

**(iii)** insight into the effects of a modern and popular WTC-related

intervention (i.e., New Ways of Working) on employee outcomes (i.e., work-nonwork balance, health/well-being, and job-related outcomes) by applying a strong intervention design, and by systematically mapping the intervention's content, implementation process, and context.

In this final chapter, the findings and conclusions of our studies are summarized in relation to the above-mentioned research issues (section 5.2.). Theoretical and practical implications will be discussed (section 5.3 and 5.4). The chapter ends with a discussion of the assets and limitations of our studies and a research agenda including promising avenues for future WTC-research (section 5.5). The closing statement will include an overall conclusion and main contribution of this thesis (section 5.6).

## 5.2. Overview of findings

### 5.2.1. Aim 1: To provide a comprehensive overview of recent empirical evidence on the associations between different subdimensions of WTC on the one hand, and theoretically relevant outcomes on the other.

We conducted a comprehensive and systematic review of existing cross-sectional, longitudinal, and intervention research on the association between WTC (-subdimensions) and key employee outcomes, that is, employees' work-nonwork balance, health and well-being, and job-related outcomes (Chapter 2). Our review study covered 63 international papers derived from 53 studies conducted between 1995 and 2011. The strongest evidence was found for favourable associations of WTC with work-nonwork balance and job-related outcomes (e.g., job satisfaction or organizational commitment), both from studies with cross-sectional designs (showing positive associations) and intervention designs (showing some favourable causal effects). Evidence for associations with favourable health or well-being were least consistent: no association was found for a range of health or well-being indicators, whereas other studies did find significant associations with other indicators of health or well-being. This suggests that WTC may yield some beneficial health-

effects (e.g., for burnout symptoms, musculoskeletal disorders, and fatigue), but that not all health-indicators are equally or consistently impacted by (changes in) WTC.

Overall, our review supported the theory-based assumption that WTC is associated with favourable employee outcomes. Most studies concerned global or multi-dimensional measures of WTC, prohibiting strong conclusions on the effectiveness of separate WTC-subdimensions. In this respect, flextime received most attention and showed promising results. The scarce research on other subdimensions (e.g., leave control and control over overtime) also generally showed favourable associations with all outcomes categories, but there is a high need for further research on these subdimensions.

Most studies applied a cross-sectional study design, signifying the need for additional intervention research to reliably examine the causal effects of WTC applications in practice. We concluded from our review that WTC is a promising tool to reconcile work and private life, to uphold employees job-related outcomes (satisfaction, motivation) and potentially to protect health and well-being. However, decisive conclusions about causal effects of WTC (-subdimensions) in diverse organizational settings cannot be drawn due to the limited number of intervention studies. Especially studies on modern interventions including far-reaching levels of WTC are warranted, as the effects of excessive levels of WTC may not necessarily converge with the effects of moderate applications of WTC mostly examined in previous studies (see 'section 5.2.3' for a thorough discussion of this line of reasoning).

### 5.2.2. Aim 2: To examine employees' access to-, need for- and use of various WTC sub-dimensions, as well as employees' mismatch between need for- and access to the various WTC subdimensions, in relation to outcome variables (i.e., work-nonwork balance, health/well-being, and job-related outcomes).

Our second study was designed to examine the prevalence of employees' (i) need for- and (ii) use of WTC (subdimensions), in

addition to employees' access to WTC (subdimensions) alone (Chapter 3). We argued that this richer conceptualization of WTC provides a better understanding of the prevalence and nature of WTC, and of its associations with relevant outcomes. In adopting a person-environment fit perspective (e.g., *5*, *6*), we also examined employees' WTC match (i.e., WTC access ~ need) or mismatch (i.e., access ≠ need) for all WTC subdimensions. A combination of high need for- but low access to WTC was coined a 'negative mismatch' (i.e., need > access) and was assumed to show unfavourable associations with employee outcomes. Data were collected by means of a questionnaire, distributed among a large quasi-representative sample of Dutch workers ($N$ = 2,420), including both day workers and shift workers, the latter group often being neglected in research on WTC (except for studies on self-scheduling, e.g., *7-10*).

The findings revealed that many Dutch employees (both shift workers and day workers) report a moderate to very high need for WTC, and that access to WTC was generally less prevalent. As a result, a negative mismatch was found to be common (on average: among 41.1% and 50.2% of day and shift workers respectively), and was more prevalent than a WTC match (i.e., access ~ need) or a positive mismatch (i.e., access > need). Negative mismatch between WTC-access and -need was highly prevalent for all separate WTC subdimensions, for dayworkers as well as shift workers (percentages of a negative mismatch ranging from 26.3% for break control to 48.1% for leave control among dayworkers, and from 40.3% for break control to 59.1% for control over on which days to work among shift workers). WTC use was common among employees who had access to WTC, with 56% (for use of control over which days to work) to 92% (for use of control over when to take leave) of day workers reporting to use WTC. For shift workers this pattern was largely the same.

Regarding associations with outcomes, findings of our second study showed that a negative mismatch between employees' need for- and access to WTC was associated with higher work-home interference (WHI) and fatigue, and with lower job motivation (Chapter 3). Except

for a small extra benefit in lower time-based WHI, having a positive mismatch (i.e., WTC need<access) was not related to more favourable outcomes than a match between WTC need and access. Contrary to our expectations, results showed that use of WTC was not associated with any further positive outcomes on top of WTC access alone.

From this second study, it can be concluded that a match between access to- and need for WTC is relevant to uphold work-nonwork balance, vitality and motivation, but that a WTC-match is absent among a significant proportion of Dutch day workers and shift workers.

### 5.2.3. Aim 3: To assess the effects of the modern WTC intervention 'New Ways of Working', by applying a strong intervention design, and by systematically mapping the intervention's content, context and process of implementation.

Many modern WTC-related interventions involve far-reaching flexibility. A popular example of a modern WTC-related intervention is New Ways of Working (NWW). In the context of NWW, employees are in principle left free to work at any time and any place they like (although within practical and legal boundaries), often by making extensive use of modern ICT applications and performance-based management to enable far reaching flexibility. According to a 'sunny perspective', higher worktime- and workplace autonomy could stimulate motivation, efficiency and performance (*11-14*), and may enable workers to successfully combine work and private life (*15*, *16*). However, endorsers of a 'gloomy perspective' point at several potential downsides of far reaching flexibility: being able to work at any time and any place may endorse long working hours (*17*), more work-home interference (*11*), and accordingly increased experienced stress (*18*, *19*). Moreover, less face-time at the office may compromise social- or instrumental support from colleagues and management (*20*, *21*). High-quality intervention studies that assess these NWW interventions are required to examine whether the sunny versus the gloomy perspective prevails. As high-quality intervention studies on NWW are currently not available, we

conducted an intervention study to examine the effects of this popular intervention.

We examined the effects of NWW within a large Dutch financial company (*N* = 2,912; Chapter 4). The intervention's content was threefold, involving implementation of (i) time independent working (implying high WTC) and place independent working ( implying telework and office redesign including flexible workplaces); (ii) extensive use of information communication and technologies (ICT's) for the conductance of time- and place independent work; and (iii) performance-based work and management. First, we aimed to examine the effects of the intervention on the organization of work, that is, on employees' control over working times (WTC) and over work locations (WLC), as well as on employees' actual working hours, work locations, and key psychosocial work characteristics. Secondly, we assessed the effects on relevant employee outcomes. As place and time independent work implies that employees are not bound to fixed working times or work locations, and with flexibility being further supported by ICT and performance-based work and management, enhanced WTC was hypothesized to be one of the main effects of NWW.

Contrary to our hypothesis, we found no significant changes in WTC after implementation of NWW, i.e. WTC remained moderately high. Employees also mainly kept working during daytime. With regard to psychosocial work characteristics, changes after implementation of NWW were also largely absent and stability in terms of favourable psychosocial work characteristics prevailed. The main effect of the intervention regarding the organization of work was that employees worked more from home and reported higher control over their work location after implementation of NWW. Apart from a small adverse effect on health, no changes were found for employees' work-nonwork balance, well-being or job-related outcomes and these employee outcomes remained favourable after implementation of NWW.

In sum, the first two studies of this dissertation concur that WTC is a promising tool for improving employees' work-nonwork balance,

health and well-being, or job-related outcomes, whereas the second study implied that this is especially true when the need for WTC is high. The majority of Dutch employees reports at least a moderate need for WTC, while access is limited for many. The third study analysed the impact of a NWW intervention, which was theorized to include very high access to worktime control. The results showed no support for overall additional beneficial effects in terms of employee outcomes. In this intervention study, work-nonwork balance, well-being/health indicators and job-related outcomes appeared to be rather favourable before the implementation of NWW and, in general, remained favourable after implementation. As such, we found no evidence for either a 'sunny' or a 'gloomy' perspective. Below, we reflect on the theoretical implications of these findings.

## 5.3. Theoretical Implications

### 5.3.1. WTC and favourable employees' outcomes

Both in organizational practice and among scholars, WTC has been repeatedly proposed as a tool to improve employees' work-nonwork balance, health and well-being, and job-related outcomes (e.g., *4*; *22*; *15*). In this dissertation we proposed three fundamental mechanisms that may underlie such benefits. According to a recovery-regulation mechanism, WTC provides employees with the opportunity to adjust their working times to their recovery needs, thereby preventing accumulation of stress or fatigue and lowering the risk for long-term health impairment. Second, WTC may enhance employees' ability to regulate time more efficiently ('time-regulation mechanism'), helping employees to align work-related time commitments with private time needs to prevent or reduce work-home interference. Finally, based on psychological and occupational health theory (e.g., the demand-control model [*23*], the job-demands resources model [*24*], the job characteristics model [*12*] and self-determination theory [*25*, *26*]), we proposed that high autonomy from WTC could potentially promote favourable employee

outcomes (e.g., lower stress, fatigue) and job-related outcomes (e.g., job motivation, job satisfaction or performance). In line with these proposed mechanisms, our systematic review (Chapter 2) revealed evidence for favourable associations between WTC and each of the outcomes categories. Many studies reported favourable associations between WTC and indicators of work-nonwork balance, job-related outcomes, and, to a lesser extent, health and well-being. The second study (Chapter 3) revealed how employees' need for WTC plays a role in determining the association between WTC access and employees' outcomes. In line with earlier work on person-environment fit (e.g., *5*, *6*) and research on individual work hour preferences (e.g., *27-29*), we found that WTC access was most beneficial to employees with a high need for WTC, and that low WTC access was especially adverse when WTC need was high. Our examination of the effects of employees' WTC use on top of WTC access alone revealed no added value in terms of work home interference, fatigue or job motivation (Chapter 3). This finding is in line with recent research from Allen and colleagues (*30*). It could imply that benefits of WTC are partly driven by mere accessibility of WTC rather than its additional utilization. As accessibility of WTC could induce a sense of control (*30*), such an explanation would be in line with theories that emphasize the basic human need for autonomy (e.g., *25*, *26, 31*). Yet, it cannot be concluded that WTC use is not beneficial for some workers. That is, low use of WTC may reflect low 'need for use' (e.g., no time-based conflicts between work and family obligations exist), whereas high use could reflect high 'need for use' (e.g., high time-based conflicts between work and family obligations). The role of 'need for WTC use' (in contrast to need for WTC access) could be subject to future studies.

### 5.3.2. New Ways of Working

In contrast to the favourable WTC-findings from our review and our questionnaire study, the results from our intervention study (Chapter 4) provide no consistent support for any beneficial effects of WTC (in the context of NWW) on outcomes. There are several explanations for this.

First, it is important to note that the NWW intervention differs from most earlier studies on WTC, both in quantity (the level of flexibility provided) and quality (the type of flexibility provided, i.e., a combination of control over working times, telework, and a flexible office design). As both a 'sunny' and a 'gloomy' perspective can be applied to such far-reaching and multi-dimensional flexibility, the effects of NWW in terms of employees' outcomes may deviate from earlier studies on moderate or 'global' WTC (Chapter 2).

Unexpectedly, WTC did not increase after implementation of NWW but remained stable at a moderately high level. As time- and place-independent work are regarded a central component of NWW (*2*, *32*), increased flexibility in working hours was anticipated. Thus, the absence of WTC increments might be interpreted as (partial) *programme failure*: the intervention did not have the anticipated effect on the theoretically relevant work characteristic WTC (*33*, *34*).

However, some considerations need to be kept in mind before drawing such a conclusion. First, NWW is a multifaceted intervention that was not solely designed to increase WTC. Instead, the intervention was multidimensional and its aims were manifold, with WTC being 'just' one ingredient of 'time and place independent work'. Our finding that employees from the intervention group did report more control over their work location, reported to use such control, and reported to work one day extra from home was supportive of at least increased workplace flexibility.

Second, we must also take into account that employees reported relatively high levels of WTC before the implementation of NWW, thereby reflecting a possible 'ceiling effect'. Our analyses on employees' actual work hours showed that employees remained working during regular work hours on traditional work days after implementation of NWW, and they reported relatively high levels of WTC at baseline. This means that also before the intervention, employees could already deviate from traditional "nine-to-five" work schedules, employees may have already

used this possibility to some extent, and remained doing so after implementation of NWW with no need for extra deviations from their traditional work schedules. In terms of Chapter 3, in this study, NWW may have posed a positive mismatch between need for and access to WTC: employees had higher access to WTC than they needed. On the contrary, control over work locations was markedly lower at baseline, and this variable did show a significant increase after implementation of NWW. Similarly, employees already scored relatively well on most outcome variables (e.g., work home interference, stress, performance), limiting potential room for further outcome improvements ('floor/ ceiling-effects').

Third, considering its potentially far-reaching nature, in line with the before-mentioned gloomy perspective, the implementation of NWW could actually have given rise to adverse outcomes instead of the often proposed advantages. The lack of overall changes in work-home balance, well-being, and job-related outcomes attributable to NWW is not supportive for such a 'gloomy', nor for a 'sunny' perspective. The findings suggest that it is possible to implement NWW without changing employees' psychosocial work characteristics and without adversely affecting employee outcomes in general. Since large scale interventions are often accompanied by 'resistance to change' or other negative side-effects (e.g., *35*, *36*), with some caution this can be regarded an overall positive outcome. Please note regarding this conclusion that a favourable intervention content and context, and a properly designed implementation process (for a description, see Chapter 4) can be considered vital elements for the stability in favourable work characteristics and employee outcomes (e.g., *37*).

The overarching theoretical conclusion from this dissertation seems twofold: on the one hand, based on both our review and questionnaire study (respectively Chapter 2 and Chapter 3), (moderate applications of) WTC seem(s) to hold important potential as a tool to improve diverse theoretically relevant employee outcomes. On the other hand, an intervention study on far-reaching and multidimensional

flexibility involving WTC (i.e., NWW) provided no empirical support for the occurrence of general benefits nor general consequences in terms of work-life balance, well-being and job-related outcomes. To draw definite conclusions on the causal impact of NWW on employee outcomes, more intervention studies are required that cover diverse organizational contexts and alternative samples (i.e., include less healthy workers and employees with a negative mismatch between WTC access and need at baseline; *33*). Furthermore, regarding more moderate applications of WTC, intervention studies are needed to examine the causal effects of specific WTC subdimensions other than flextime, such as control over leave or overtime work. Testing various WTC based intervention paradigms in different occupational settings will shed more light on the contextual, process- and content factors that either help or hinder successful implementation of WTC and offer a more rigorous test of the intervention theory. Such studies should pay attention to both effect evaluation and process evaluation (*34*, *38*, *39*). In this context we would like to echo the conclusion of Durlak (*40*), that it is not evidence-based programs that are effective, but well-implemented evidence-based programs.

## 5.4. Practical Implications

In the light of the ongoing flexibilization of working hours (*1*), the research presented here has high practical value. Based on the findings from this dissertation, we provide the following recommendations for practice:

First, as there is evidence that WTC is a promising tool for upholding employees' work-nonwork balance, well-being, and job-related outcomes, we recommend a wider implementation of WTC-related practices, especially because many employees have a moderate to strong need for various WTC subdimensions, yet a large proportion of Dutch workers experiences a negative mismatch between WTC need and access for most WTC-subdimensions. As many employees would

potentially benefit from having more access to (moderately) high WTC levels, organizations would do well to map their employees' need for several WTC-subdimensions and enable WTC access when possible. Appendix 4 of this dissertation presents a practical monitor for organizations to identify current levels of access to- and need for- WTC-subdimensions, along with a formula that can be applied to calculate the level of WTC-(mis)match between access and need among employees. This monitor can be included in risk assessments that organizations are legally bound to conduct (see Dutch work conditions legislation: *41*).

An unfavourable WTC mismatch (need > access) was found to be especially common among shift workers. As shift work is associated with various taxing elements and adverse health outcomes (e.g., *42*, *43*), shift workers may especially benefit from enhanced WTC. WTC in shift work settings can be established in diverse levels of intensity, ranging from the possibility for informal shift swapping among colleagues, to requesting standard veto days on which not to work, to far-reaching self-scheduling where employees compose their own 'ideal' individual work schedule prior to each scheduling period (*8*, *44*). Such self-scheduling often uses IT software to incorporate both staffing needs as indicated by the employer and employees' work hour preferences into the scheduling procedure. Some studies on self-scheduling provide evidence for beneficial effects on employee outcomes (e.g., on work-life balance or job satisfaction; *10*). On the other hand, other studies found no such support (e.g., *9*), or point out that not all self-scheduling interventions succeed in enhancing WTC (e.g., *7*).

Far-reaching applications of WTC have the highest chance of success, in case the content of the WTC-intervention is employee-oriented (aims to [also] benefit employees). Regarding self-scheduling, this may imply timely announcement of the definite schedule, the opportunity to apply veto-days, the possibility of last-minute informal swapping, sufficient recovery time in-between shifts, and exclusion of a buffer around the preferred start and ending times; for a more detailed description, please see Garde and colleagues (*7*). Moreover, a systematic

and favourable process of implementation is also vital in case of far-reaching WTC-interventions. Regarding self-scheduling interventions this implies for instance employee participation regarding the content of the intervention, sufficient support from management in terms of time and money, training to use the schedule software, and high-quality software.

Finally, also context factors determine the effects of WTC-interventions: when baseline features in terms of work-life balance, well-being, and job-related outcomes are quite favourable, no large positive effects can be expected to follow the intervention. This seemed the case in our intervention study on NWW. It implies that not all employees will necessarily profit from WTC-related interventions, and effects may be limited in magnitude, depending on individual needs and the absence or presence of problems with work-life balance, well-being, or job-motivation at baseline. This pleads for a tailor-made approach in implementing WTC in practice. We therefore recommend practitioners to precede WTC-based interventions with a careful need assessment among the target groups. The scale presented in Appendix 4 could be used for this purpose (based on Table 3.1, p.77).

Our study on New Ways of Working provided a comprehensive description and analysis of an exemplary intervention for the modern world of work. Considering the trend of work flexibilization, which is catalyzed by the development of modern information and communication technology (ICT) applications, various forms of NWW may be expected to be implemented among many organizations in the near future (e.g., *2*, *45*). The reported absence of intervention effects on employee outcomes is in contrast with the highly held expectations of some (e.g., *46*), but also provides no empirical basis for a more gloomy perspective (e.g., *19*). It can be concluded from this study that it is possible to implement NWW without negatively affecting psychosocial work characteristics or employee outcomes, as long as the intervention content, process, and context are favourable. As NWW may have benefits outside the scope of our study (such as

cost reductions), the absence of such adverse effects can be regarded as positive. Based on our analysis we do not explicitly encourage or discourage NWW interventions. It may well be that in reality NWW can be used both for the better ('sunny' perspective) and for worse ('gloomy' perspective). Information provided in our intervention description (in terms of intervention content, process factors, and context, see Chapter 4) may guide future NWW interventions. As to the former and regarding the NWW-content, the required minimum of two days office presence per week may have helped to maintain social cohesion among employees. In addition, the provision of ergonomic guidelines that was accompanied by a small home-workplace budget for all employees may have helped to prevent negative effects of increased working from home. Also, regarding the process of implementation, it is worth mentioning that the organization ensured (top) management support, provided workshops for employees and managers, discussed NWW with involved employees during meetings and evaluation talks, and installed a multidisciplinary NWW team to prepare, monitor and support the intervention process.

In sum, given (i) the high need for WTC (but lower access to WTC) among the majority of Dutch employees, (ii) the promising findings of WTC regarding employees' work-nonwork balance, health and well-being, and job-related outcomes, and (iii) the lack of adverse associations or effects, our findings generally stem in favour of WTC provision. As such, the findings from this dissertation are supportive of recent Dutch governmental initiatives to enhance employees' possibilities to attain WTC on the basis of employees' individual needs.

## 5.5. Assets, limitations and future research avenues

### 5.5.1 Assets

A key strength of this dissertation is the multi-method paradigm that was applied to examine WTC-applications. A systematic review (including cross-sectional, longitudinal and intervention research) first

analyzed and summarized the state of evidence for associations or effects of WTC on diverse theoretically relevant outcomes. Second, a questionnaire study among a large and (quasi-) representative sample of Dutch workers addressed research issues that were identified in the review and explored the prevalence of WTC access, need, and use for various individual WTC-subdimensions (flextime, control over leave, breaks, which days to work, the distribution of work hours over the week, and overtime) along with theoretically relevant associations. Finally, an intervention study assessed the practical application and effects of a far-reaching NWW-intervention including elements of WTC. This intervention study allowed for a tentative analysis of effect causality, i.e., do modern (worktime) flexibility interventions contribute to enhanced WTC, and does enhanced WTC improve theoretically relevant employee outcomes? As intervention field studies with a strong research design (i.e., containing pre- and several post measurements, and a reference group) are scarce (e.g., *22*, *47*), and as New Ways of Working were so far under-studied we believe that the current study provides a much-needed contribution in testing the effects of a modern and popular multidimensional WTC-related intervention.

A second asset of the dissertation lies in its 'rich scope': Firstly, all studies included a multitude of relevant outcome measures. By covering work-nonwork balance, health and well-being, as well as job-related outcomes (e.g., motivation or organizational commitment), this research provides a comprehensive understanding of WTC, and of its multifaceted potential regarding outcome variables derived from multiple theoretical perspectives. Secondly, the studies involve many different samples. The review provided an international coverage, including European and non-European countries such as Japan, United States of America, and Singapore. The sample of the questionnaire study represented various occupations and worker types from the Netherlands, including a comparison of day workers and shift workers.

Furthermore, we applied a thorough measurement of key constructs. Regarding WTC, the dissertation provides both researchers and

practitioners with a comprehensive measurement tool to assess not only employees' access to, but also need for and use of various subdimensions of WTC, which are relevant in need assessments and when testing or predicting effects of WTC interventions from a practical or scientific viewpoint (see Appendix 4).

Finally, the dissertation provides a thorough description of the content and process of implementation of a popular (WTC-related) intervention (i.e., NWW), together with a broad assessment of the intervention's effects on WTC, key work characteristics and relevant employees' outcomes.

### 5.5.2. Limitations and future research avenues

In interpreting the presented findings, we must bear in mind a number of study limitations. First, our intervention study presents only a single case. The effects of interventions are always strongly contingent on a multitude of factors (*37*), including (i) the intervention content (e.g., the quality and quantity of WTC implemented and whether only WTC is introduced or the intervention is multidimensional, also including other changes), (i) the intervention context (e.g., motivation for intervention, baseline characteristics of the sample), (iii) implementation introduction and process (e.g., employee involvement; *48*) and (iv) sample characteristics (e.g., employees' preferences or need for WTC). As such, no definite conclusions can be drawn about the effects of NWW before additional studies assessed the effects among other samples and settings (*33*, *34*). In light of large variations in intervention content, process and context, it is hardly possible to generalize findings from any intervention study to other NWW interventions, within different organizations. Additional high quality intervention studies on NWW are required to learn more about which factors modify intervention outcomes and under which circumstances.

Furthermore, as in the intervention study randomization to either the intervention or reference group was not possible, we could not rule

out pre-selection of conditions. Indeed, reference and intervention groups were not entirely comparable. Such limitations are common to workplace intervention studies (*33*), but nevertheless limit the conclusiveness of such studies with respect to causality. Yet, we believe that our intervention study on NWW does provide an example of favourable intervention content, process and context which may guide future implementations. Future research should further illuminate which factors either help or hinder successful implementation of WTC, preferably while adopting carefully matched reference groups.

As every advantage includes a potential downside, the broad focus of our research simultaneously meant that our current analyses often did not distinguish between theoretically relevant subgroups. This might play a role in the relatively small effect sizes (Chapter 3) or the absence of effects altogether (Chapter 4). Regarding NWW, it might be possible that some employees actually benefit from increased flexibility (supporting the 'sunny perspective'), with such effects being masked by adverse effects among another group of employees (supporting the 'gloomy view'). Previous research suggests that the effects of interventions may, to some extent, depend on employees' baseline characteristics in terms of well-being, health, and work-nonwork balance, their personal preferences (*8*, *27*, *49*), the encountered leadership style (*50*), resistance against change (*35*) or employees' attributions about the aim of an intervention (i.e., employees ideas about whether the intervention is introduced to benefit the organization, the employees, or both [*51*]). Although the dissertation investigated employees' need for WTC in the survey study (Chapter 3) and employees satisfaction with WTC in the intervention study (Chapter 4), future research might also focus on the reasons why some employees report higher or lower levels of WTC need. As WTC has been proposed as a tool to improve workforce participation of female or older workers (*1*, *52*, *53*), future studies could also assess the effects of WTC for such theoretically relevant subgroups (see for example *54*), thus addressing the role of employees' age, gender or family situation.

Another future avenue for research would be to assess the effects of various WTC subdimensions in more detail. It can be argued that various WTC subdimensions impact employees' outcomes through different mechanisms, and that the effects of such WTC subdimensions impact some outcome categories more than others. For example, control over breaks could be mainly related to recovery-related outcomes (e.g., fatigue), whereas flextime may be more strongly related to the time-regulation mechanism and therefore mostly impact time-related outcomes (e.g., [time-based] work home interference). As many studies measured WTC in a global way, only little is known about the distinct effects of various WTC subdimensions on various recovery-related and time-related outcomes (see Chapter 2 for the limited current knowledge on the effects of WTC-subdimensions).[1]

A final important limitation of this dissertation is our sole reliance on self-report measurements. Despite being common in the field of work psychology, this methodology is potentially prone to common-method bias. Although the risk of common-method bias has been suggested to be only minimal (*55*), future research would benefit from incorporating administrative data such as performance ratings, turnover rates or data on sickness absence as additional indicators of key outcome variables.

## 5.6. In conclusion

The work presented in this dissertation contributes to our understanding of WTC in relation to employees' relevant key outcomes. WTC appears to be a promising tool for maintaining or improving employees' work-nonwork balance, health and well-being and job-related outcomes. WTC-related workplace interventions such as NWW do not necessarily result in improved employee outcomes when baseline features are already favourable. In such a situation, our findings show that it is possible to implement cost-reductive worktime and workplace flexibility

1 Studies on specific WTC subdimensions can only be validly conducted when diverse WTC subdimensions do not correlate too strongly. In case of high intercorrelations, effects of individual WTC subdimensions cannot be distinguished.

interventions without adversely affecting theoretically relevant outcomes. Implementation of any WTC-intervention should preferably be preceded by a careful need assessment among target groups. As worktime flexibility will likely become more widespread over the years to come, well-implemented WTC interventions (in terms of favourable content and implementation process) may provide an advantageous way to benefit both the employer and the employee, making WTC a combination of employer- and employee-based flexibility. Monitoring the diverse WTC-based interventions and their effects among various work samples and settings remains relevant to both academics and practitioners.

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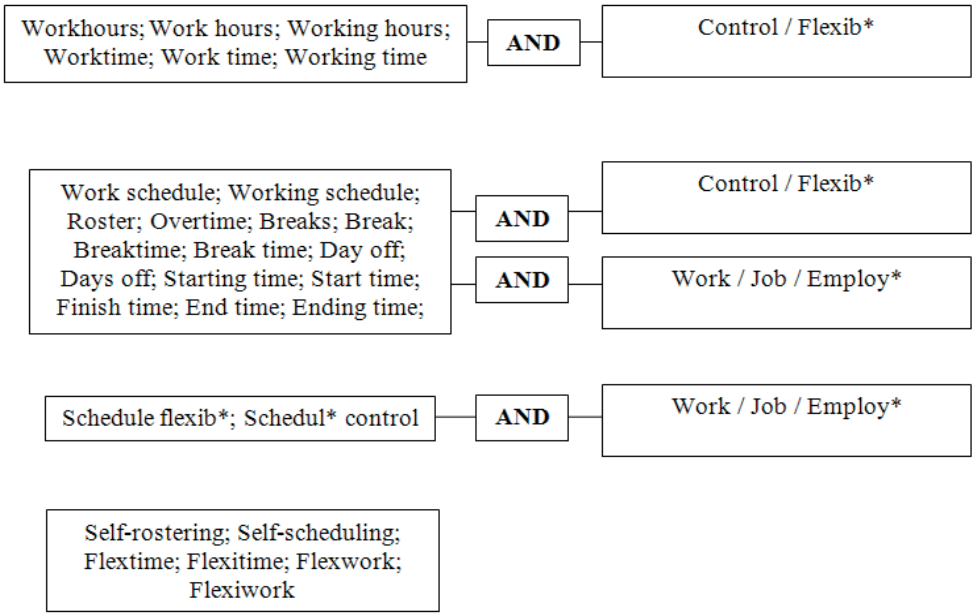
# Appendix

# Appendix 1

## Search terms used in literature search (Chapter 2)




PsycINFO entry:

(((Workhours or work-hours or working-hours or worktime or work-time or working-time) and (control or flexib*)) or ((work schedule or working schedule or roster or overtime or breaks or break or breaktime or break-time or day off or days off or starting time or start time or finish time or end time or ending time) and ((control or flexib*) and (work or job or employ*))) or ((Schedule flexib* or schedul* control) and (work or job or employ*)) or (Self rostering or Self scheduling or Flextime or Flexitime or Flexwork or Flexiwork))

PubMed entry:

((((((Self-rostering[Title/Abstract]) OR Self-scheduling[Title/Abstract]) OR Flex*time[Title/Abstract]) OR Flex*work[Title/Abstract]) OR Self rostering[Title/Abstract]) OR Self scheduling[Title/Abstract]) OR ((((((((Workhours[Title/Abstract]) OR Work hours[Title/Abstract]) OR WorkingHours[Title/Abstract]) OR Worktime[Title/Abstract]) OR Working time[Title/Abstract]) OR Worktime[Title/Abstract]) AND ((Control[Title/Abstract]) OR Flexib*[Title/Abstract])) OR ((((((((((((((((Roster[Title/Abstract]) OR work schedule[Title/Abstract]) OR working schedule[Title/Abstract]) OR overtime[Title/Abstract]) OR breaks[Title/Abstract]) OR break[Title/Abstract]) OR breaktime[Title/Abstract]) OR break time[Title/Abstract]) OR day off[Title/Abstract]) OR days off[Title/Abstract]) OR starting time[Title/Abstract]) OR start time[Title/Abstract]) OR finish time[Title/Abstract]) OR end time[Title/Abstract]) OR ending time[Title/Abstract]) AND (((Work[Title/Abstract]) OR Job[Title/Abstract]) OR Employ*[Title/Abstract]) AND ((Control[Title/Abstract]) OR Flexib*[Title/Abstract])) OR ((((Schedul* control[Title/Abstract]) OR Schedul* flexib*[Title/Abstract])) AND (((Work[Title/Abstract]) OR Job[Title/Abstract]) OR Employ*[Title/Abstract]))

# Appendix 2

## Analysis of representativeness (Chapter 3)

| | Complete sample *[NEA 2010] | Complete sample [NEA follow-up questionnaire 2012; employed respondents] | Sample in current study [NEA follow-up questionnaire, 2012; after selection] |
|---|---|---|---|
| **N** | **23,788** | **2,241** | **2,170** |
| *Gender* | % | % | % |
| Female | 47 | 44 | 44 |
| Male | 53 | 56 | 56 |
| *Age* | | | |
| 15-24 | 15 | 2.4 | 1.5 |
| 25-54 | 70 | 70.7 | 71.5 |
| 55-64 | 15 | 26.3 | 26.4 |
| ≥ 65 | 0 | 0.6 | 0.6 |
| *Occupation* | | | |
| Manufacturing | 14.0 | 8.0 | 7.9 |
| Transport | 5.1 | 2.6 | 2.4 |
| Administrative | 11.8 | 12.2 | 12.0 |
| Commercial | 12.4 | 7.4 | 7.1 |
| Services | 10.6 | 8.4 | 8.4 |
| Healthcare | 14.6 | 14.6 | 14.7 |
| Education | 5.7 | 9.2 | 9.4 |
| Specialist | 9.5 | 16.1 | 16.5 |
| Agraric | 1.8 | 0.8 | .7 |
| Executive | 6.0 | 11.0 | 11.2 |
| Other | 8.6 | 9.6 | 9.4 |
| *Education* | | | |
| Low (<=VBO) | 26.1 | 9.9 | 9.4 |
| Mid (HAVO - MBO) | 43.0 | 36.9 | 36.6 |
| High (HBO - WO) | 31.0 | 53.2 | 54.0 |
| *Family situation* | | | |
| Partner / no children | 27.3 | 33.9 | 33.8 |
| Partner / children | 43.0 | 46.1 | 46.5 |
| Single / children | 3.8 | 3.8 | 3.8 |
| Single / no children | 15.3 | 13.7 | 13.7 |
| Other | 10.6 | 2.6 | 2.1 |

* NEA: National Survey Working Conditions (in the Netherlands; *44*)

# Appendix 3

## Response analysis: Comparison respondents vs. non-respondents on pre-measure (Chapter 4)

| | | Response / no response | | | |
|---|---|---|---|---|---|
| **Variable** | **Condition** | **Respondents** | | **Non-respondents** | |
| | | M | SD | M | SD |
| Age | Intervention | 43.08 | 9.37 | 41.23 | 10.18 |
| | Reference | 42.04 | 11.82 | 44.62 | 11.32 |
| Contractual hours | Intervention | 34.47 | 5.81 | 32.84 | 9.38 |
| | Reference | 34.48 | 5.65 | 25.94 | 15.64 |
| | | % | | % | |
| Gender | Intervention | 65.1 | | 60.3 | |
| % male | Reference | 57.5 | | 48.9 | |
| Supervisor | Intervention | 7.4 | | 8.3 | |
| % supervisor | Reference | 6.9 | | 3.1 | |

# Appendix 4a

## Questionnaire to assess (i) need for, (ii) access to and (iii) use of worktime control

| Response labels | | (Almost) Not at all | To a limited extent | To a reasonable extent | To a high extent | To a very high extent |
|---|---|---|---|---|---|---|
| Label values (for calculation) | | 1 | 2 | 3 | 4 | 5 |
| *(i) WTC need* | | | | | | |
| To what extent do you have the need to .. | | | | | | |
| 1 | .. determine the starting and ending times of your working day yourself? | 0 | 0 | 0 | 0 | 0 |
| 2 | .. determine yourself when to take a break? | 0 | 0 | 0 | 0 | 0 |
| 3 | .. take leave (day off, holidays) when you want? | 0 | 0 | 0 | 0 | 0 |
| 4 | .. determine yourself on which days to work? | 0 | 0 | 0 | 0 | 0 |
| 5 | .. determine the distribution of your working hours over the work week yourself? | 0 | 0 | 0 | 0 | 0 |
| 6 | .. determine yourself whether to work overtime? | 0 | 0 | 0 | 0 | 0 |
| *(ii) WTC access* | | | | | | |
| To what extent do you have the possibility to .. | | | | | | |
| 1 | .. determine the starting and ending times of your working day yourself? | 0 | 0 | 0 | 0 | 0 |
| 2 | .. determine yourself when to take a break? | 0 | 0 | 0 | 0 | 0 |
| 3 | .. take leave (day off, holidays) when you want? | 0 | 0 | 0 | 0 | 0 |
| 4 | .. determine yourself on which days to work? | 0 | 0 | 0 | 0 | 0 |
| 5 | .. determine the distribution of your working hours over the work week yourself? | 0 | 0 | 0 | 0 | 0 |
| 6 | .. determine yourself whether to work overtime? | 0 | 0 | 0 | 0 | 0 |

| Response labels | | (Almost) Not at all | To a limited extent | To a reasonable extent | To a high extent | To a very high extent |
|---|---|---|---|---|---|---|
| *(iii) WTC use* | | | | | | |
| To what extent do you make use of your possibility to .. | | | | | | |
| 1 | .. determine the starting and ending times of your working day yourself? | 0 | 0 | 0 | 0 | 0 |
| 2 | .. determine yourself when to take a break? | 0 | 0 | 0 | 0 | 0 |
| 3 | .. take leave (day off, holidays) when you want? | 0 | 0 | 0 | 0 | 0 |
| 4 | .. determine yourself on which days to work? | 0 | 0 | 0 | 0 | 0 |

# Appendix 4b

## Calculation of mismatch

### *a. per subdimension*

Mismatch value = WTC access (subdimension X) – WTC need (subdimension X)

| Mismatch value | Label |
|---|---|
| 0 | Match |
| < 0 | Negative mismatch |
| > 0 | Positive mismatch |

### *Total mismatch value:*

Mean (Mismatch value $X_{1;}$ Mismatch value $X_{2;}$ Mismatch value $X_{3;}$ Mismatch value $X_{4;}$ Mismatch value $X_{5;}$ Mismatch value $X_{6}$)

| Total mismatch value range | Label |
|---|---|
| 1.00 - 4.00 | Positive mismatch |
| -0.99 - 0.99 | Match |
| -1.00 - -4.00 | Negative mismatch |

Reference: Nijp, H.H., Beckers, D.G.J., Kompier, M.A.J., van den Bossche, S.N.J. & Geurst, S.A.E. (2015). Worktime control access, need and use in relation to work–home interference, fatigue, and job motivation. *Scandinavian Journal of Work Environment and Health*, 41(4):347-55. doi:10.5271/sjweh.3504

# Appendix 4c

## Nederlandse vragenlijst voor het meten van (i) behoefte aan, (ii) toegang tot en (iii) gebruik van werktijdcontrole.

| Antwoordlabels | | (Vrijwel) niet | In beperkte mate | In redelijke mate | In sterke mate | In zeer sterke mate |
|---|---|---|---|---|---|---|
| Labelwaarden (voor berekening) | | 1 | 2 | 3 | 4 | 5 |
| *(i )WTC behoefte* | | | | | | |
| In welke mate heeft u er behoefte aan om.. | | | | | | |
| 1 | .. zelf de begin- en eindtijden van uw werkdag te bepalen? | 0 | 0 | 0 | 0 | 0 |
| 2 | .. zelf te bepalen wanneer u pauzeert? | 0 | 0 | 0 | 0 | 0 |
| 3 | ..verlof (een vrije dag, vakantie) op te nemen wanneer u dat wilt? | 0 | 0 | 0 | 0 | 0 |
| 4 | .. zelf te bepalen op welke dagen u werkt? | 0 | 0 | 0 | 0 | 0 |
| 5 | .. zelf uw werkuren over de dagen in de week te verdelen? | 0 | 0 | 0 | 0 | 0 |
| 6 | .. zelf te bepalen of u overwerkt? | 0 | 0 | 0 | 0 | 0 |
| *(ii) WTC toegang* | | | | | | |
| In hoeverre heeft u de mogelijkheid om.. | | | | | | |
| 1 | .. zelf de begin- en eindtijden van uw werkdag te bepalen? | 0 | 0 | 0 | 0 | 0 |
| 2 | .. zelf te bepalen wanneer u pauzeert? | 0 | 0 | 0 | 0 | 0 |
| 3 | ..verlof (een vrije dag, vakantie) op te nemen wanneer u dat wilt? | 0 | 0 | 0 | 0 | 0 |
| 4 | .. zelf te bepalen op welke dagen u werkt? | 0 | 0 | 0 | 0 | 0 |
| 5 | .. zelf te bepalen hoe u uw werkuren over de dagen in de week verdeelt? | 0 | 0 | 0 | 0 | 0 |
| 6 | .. zelf te bepalen of u overwerkt? | 0 | 0 | 0 | 0 | 0 |

| Antwoordlabels | | (Vrijwel) niet | In beperkte mate | In redelijke mate | In sterke mate | In zeer sterke mate |
|---|---|---|---|---|---|---|
| *(iii) WTC gebruik* | | | | | | |
| In hoeverre maakt u daadwerkelijk gebruik van uw mogelijkheid om .. | | | | | | |
| 1 | .. zelf de begin- en eindtijden van uw werkdag te bepalen? | 0 | 0 | 0 | 0 | 0 |
| 2 | .. zelf te bepalen wanneer u pauzeert? | 0 | 0 | 0 | 0 | 0 |
| 3 | ..verlof (een vrije dag, vakantie) op te nemen wanneer u dat wilt? | 0 | 0 | 0 | 0 | 0 |
| 4 | .. zelf te bepalen op welke dagen u werkt? | 0 | 0 | 0 | 0 | 0 |

# Appendix 4d

## Berekening van mismatch

### *a. per subdimensie*

Mismatch waarde = WTC toegang (subdimensie X) – WTC behoefte (subdimensie X)

| Mismatch waarde | Label |
|---|---|
| 0 | Match |
| < 0 | Negatieve mismatch |
| > 0 | Positieve mismatch |

### *Totale mismatch waarde:*

Gemiddelde (Mismatch waarde $X_1$; Mismatch waarde $X_2$; Mismatch waarde $X_3$; Mismatch waarde $X_4$; Mismatch waarde $X_5$; Mismatch waarde $X_6$)

| Totale mismatch waarde range | Label |
|---|---|
| 1.00 - 4.00 | Positieve mismatch |
| -0.99 - 0.99 | Match |
| -1.00 - -4.00 | Negatieve mismatch |

Referentie: Nijp, H.H., Beckers, D.G.J., Kompier, M.A.J., van den Bossche, S.N.J. & Geurst, S.A.E. (2015). Worktime control access, need and use in relation to work–home interference, fatigue, and job motivation. *Scandinavian Journal of Work Environment and Health*, 41(4):347-55. doi:10.5271/sjweh.3504

# Summary

## Dissertation background

Today's world of work is characterized by high performance needs and demanding work hours. In order to remain competitive, organizations seek ways to promote a healthy and motivating work design for attracting and retaining a skilful and productive workforce. The rising number of dual-earner families calls for tools that enable a proper balance between work and family life. At the same time, modern information and communication technologies (ICTs) permit greater flexibility in the organization of work hours and work location. This context has drawn attention to worktime control (i.e., an employees' possibility to control the duration, position and distribution of worktime; WTC) as a potential tool to improve or uphold employees' health, work-nonwork balance, and work motivation in the demanding world of work. The aim of the current dissertation was to empirically examine the prevalence, associations and effects of WTC with regard to employees' work-nonwork balance, health and well-being, and job-related outcomes (e.g., job satisfaction, job motivation, or performance).

## Summary of findings

In our first study, we provided a comprehensive overview of empirical evidence on the relation between WTC and diverse employee outcomes. In this review, we distinguished between various forms ('subdimensions') of WTC (e.g. control over leave or over starting and ending times of the workday) and their relation with theoretically relevant outcomes (i.e., work-nonwork balance, health and well-being and job-related outcomes). A systematic search of empirical studies published between 1995-2011 resulted in 63 relevant papers from 53 studies. The strongest evidence was found for favourable associations of WTC with work-nonwork balance, both from studies with cross-sectional designs and intervention designs. Evidence for associations with favourable health/well-being was somewhat less consistent, suggesting that WTC may yield some beneficial health effects (e.g.,

for burnout and musculoskeletal disorders) but that not all-health indicators are equally impacted by WTC.

Our review study lead us to conclude that WTC can be viewed as a promising tool for reconciling work and private life, and potentially also to uphold health, well-being, and job-related outcomes. However, more intervention studies on WTC are needed to draw definite conclusions about the effects of enhancing WTC in organizational settings.

In our second study, we aimed to provide more detailed knowledge on the prevalence of employees' access to, need for, and use of WTC, as well as employees' mismatch between need for and access to WTC. Moreover, these WTC variables were assessed in relation to theoretically relevant employees' outcomes. Questionnaire data were collected among a large (n = 2,420) quasi-representative sample of Dutch employees. We found that many Dutch employees report a moderate to very high need for WTC, while actual access was generally less prevalent. As such, a negative mismatch between access to and need for WTC (i.e., access < need) was highly prevalent for day workers as well as for shift workers. This negative WTC mismatch was associated with relatively high levels of negative work-home interference and fatigue, and lower job motivation. Use of WTC was highly prevalent among employees with WTC access, but was not meaningfully associated with work-nonwork balance, fatigue or motivation. Based on the findings of study 2, we concluded that a match between access to- and need for WTC is relevant to uphold work-nonwork balance, vitality and motivation, but that such a match is absent among a significant proportion of Dutch workers.

Finally, in the third study of this dissertation, we examined the effects of a modern WTC-related intervention, i.e. New Ways of Working (NWW). NWW is popular in modern work society and entails time and place independent work, often combined with extensive use of ICT and performance based management. We studied the effects of NWW on both the organization of work (changes in control over time

and place of work; working hours and work location; and other key job characteristics), and on employees' outcomes (work-nonwork balance; health and well-being; and job-related outcomes). In studying these effects, we applied a strong intervention design, and systematically mapped the intervention's content, implementation process, and context. The study was conducted within a large Dutch financial company (N = 2,912) where NWW was implemented, and included three measurement waves among an intervention group (baseline: n=2,391) and a reference group (baseline: n=521).

The findings reveal a large shift from hours worked at the office to hours worked at home after implementation of NWW. Accordingly, employees' commuting time was reduced among employees from the intervention group. However, WTC was not significantly impacted by the intervention and remained favourable. Moreover, employees remained working on week days and during day time. Psychosocial work-characteristics, work-non work balance, stress, fatigue, and job-related outcomes also remained favourable and largely unaffected. However, the health score in the intervention group decreased after implementation of NWW, despite stability in most other outcome indicators. Together, the findings from the third study suggest that the implementation of NWW does not necessarily lead to consistent changes in psychosocial work characteristics, well-being or job-related outcomes.

In sum, the first two studies of this dissertation concur that WTC is a promising tool to uphold employees' work-nonwork balance, health and well-being, and job-related outcomes, whereas the second study implied that this is especially true when the need for WTC is high. The majority of Dutch employees reports at least a moderate need for WTC, while access is limited for many. The third study showed that it is possible to implement a far-reaching and cost-reductive NWW-intervention while remaining favourable levels of employee work-nonwork balance, well-being and job-related outcomes.

## Theoretical implications

In this dissertation, three fundamental mechanisms were proposed to account for potential benefits of WTC. First, according to the 'recovery-regulation mechanism', WTC provides employees with the opportunity to adjust their working times to their recovery needs. WTC may hereby reduce the accumulation of stress or fatigue over time, and prevent long-term health impairment. Second, according to a 'time-regulation mechanism', WTC may help employees to align work-related time commitments with private time needs to reduce work-home interference. Finally, WTC provides employees with autonomy, which, based on psychological and occupational health theory, could promote job-related outcomes (e.g., job motivation, job satisfaction or performance). In showing positive associations between WTC and work-nonwork balance, health and well-being, or job-related outcomes, the findings from the first two studies are in line with these proposed mechanisms. Our second study additionally implied that access to WTC is especially beneficial when employees' need for WTC is high. This corroborates a person-environment fit perspective, in showing that a match between an employees' needs and the actual working conditions is central for promoting favourable employee outcomes.

NWW pose a relatively new multidimensional intervention including a far-reaching form of WTC, while research that examines its' effects is still scarce. Despite its popularity, the potential benefits of NWW (e.g., improved motivation, work efficiency and work-life balance) may well be overshadowed by several potential negative 'side-effects' (e.g., increased stress, fatigue or work-home interference due to blurring boundaries or declining social support). Accordingly, in practice, expectations regarding NWW's potential effects diverge from positive ('sunny perspective') to sceptical ('gloomy perspective'). Our intervention study did not show any effects of the implementation of NWW on a broad range of outcomes (covering variables related to the organization of work hours, psychosocial working conditions

and employee well-being, work-nonwork balance, and job-related outcomes). Notably, the implementation of NWW was not found to impact WTC levels within this organization as expected. This lack of overall changes does not support a 'gloomy', nor a 'sunny' perspective. Since outcomes remained favourable after implementation of NWW and because large scale interventions are often met with resistance to change or negative side-effects, this stability can be regarded a somewhat positive outcome.

In sum, the theoretical outcome of the dissertation is twofold: WTC seems to hold important potential to improve or uphold employees' outcomes, but far-reaching and multidimensional interventions on flexibility - including WTC (i.e. NWW) - are not necessarily effective in improving such outcomes. More high-quality intervention studies are needed to draw definite conclusions on NWW. Moreover, there is a high need for intervention studies focusing on the effects of more moderate applications of WTC and its' subdimensions (e.g., enhancing control over overtime or leave control in real-life work settings).

## Practical implications

In the context of ongoing flexibilization of working hours and recent Dutch governmental initiatives to enhance employees' WTC, the research presented here holds high value for organizational practice. First, based on the promising findings on WTC in general, a wider implementation of moderate WTC-related practices seems recommendable. Many Dutch employees experience lower access to WTC than they prefer. As such, organizations would do well to map their employees' need for WTC-subdimensions and enable or increase WTC access when possible. Moreover, we also found an unfavourable WTC mismatch (a need for more WTC than provided) to be especially common among shift workers. While shift work is associated with various taxing elements and adverse health outcomes, especially shift

workers may benefit from enhanced WTC (e.g., by means of introducing moderate or extensive levels of self-scheduling).

The findings from the intervention study suggest that it is possible to implement NWW without adversely affecting psychosocial work characteristics or employee outcomes, as long as the intervention content, implementation process and context are favourable. The thorough description of the intervention in this dissertation may guide future NWW interventions. Based on the findings of our second study, we recommend such interventions to be preceded by an thorough examination of employees' flexibility needs and to align WTC access with employees' needs for flexibility.

Taken together, given (i) the high need for WTC (but lower access to WTC) among the majority of Dutch employees, (ii) the promising findings of WTC regarding employees' work-nonwork balance, health and well-being, and job-related outcomes, and (iii) the lack of adverse associations or effects, even in far-reaching WTC-related interventions, our findings generally stem in favour of WTC provision. As such, the findings from this dissertation are supportive of recent Dutch governmental initiatives to enhance employees' WTC on the basis of employees' individual needs.

## Strengths and limitations

The dissertation has several key strengths. First, we applied a multi-method paradigm to examine WTC, combining a literature review, a questionnaire study among a large quasi-representative sample of the Dutch working population, and a thorough intervention study. Second, the dissertation has a 'rich scope': all studies included a multitude of relevant outcome measures (work-nonwork balance, health and well-being, as well as job-related outcomes) and the studies cover many different study samples, adding to the generalizability of our conclusions. A thorough measurement of key constructs was applied,

including attention for different subdimensions of WTC (e.g., control over daily starting and ending times, leave or breaks) as well as a focus on employees' need for and use of WTC, instead of WTC access alone. Finally, the dissertation provides an elaborate description of the content and process of implementation of a popular (WTC-related) intervention (New Ways of Working), together with a broad assessment of the intervention's effects on WTC, work-location (control), key psychosocial work characteristics and relevant employee outcomes.

A number of study limitations must be kept in mind that may limit the conclusiveness of our studies. First, our intervention study presents only a single case. The effects of interventions are always strongly contingent on a multitude of factors, including the intervention content and context, the process of implementation and sample characteristics. Second, randomization to either the intervention or reference group was not feasible, and the intervention and control group were not fully 'identical'. No definite conclusions can thus be drawn about the general effects of NWW based on the results from this dissertation alone. Moreover, the broad focus of our research meant that our current analyses often did not distinguish between theoretically relevant subgroups (e.g., based on gender, age or family situation). This could partly account for the relatively small effect sizes or the absence of effects altogether. Regarding NWW, some employees may benefit from increased flexibility, with such effects being masked by adverse effects among another group of employees. For future studies, it would be relevant to also assess the role of contextual factors (such as baseline well-being, health, and work-nonwork balance, personal preferences, leadership style, or employees' attributions about the aim of an intervention) in relation to the effects of WTC-interventions (e.g., NWW). A final important limitation of this dissertation is our reliance on self-report measurements. Although the risk of common-method bias has been argued to be minimal, future research would benefit from incorporating administrative data on performance, turnover or sickness absence as additional outcome indicators.

## Overall conclusion

This dissertation contributes to our understanding of WTC in relation to employees' relevant key outcomes. WTC appears to be a promising tool for maintaining or improving employees' work-nonwork balance, health and well-being and job-related outcomes. WTC-related workplace interventions such as NWW do not necessarily result in improved employee outcomes when baseline features are already favourable. In such a situation, our findings show that it is possible to implement cost-reductive worktime and workplace flexibility interventions without adversely affecting theoretically relevant outcomes. Implementation of any WTC-intervention should preferably be preceded by a careful need assessment among target groups. As worktime flexibility will likely become more widespread over the years to come, well-implemented WTC interventions (i.e., with a favourable content and implementation process) may provide an advantageous way to benefit both the employer and the employee, making WTC a combination of employer- and employee-based flexibility. Monitoring the diverse WTC-based interventions and their effects among various work samples and settings remains relevant to both academics and practitioners.

# Samenvatting

## Achtergrond

Modern werk wordt gekenmerkt door een hoge prestatiedruk en veeleisende werktijden. Ten behoeve van hun (internationale) concurrentievermogen zoeken organisaties manieren om het werk op gezonde en motiverende wijze in te richten om zodoende vaardig en productief personeel aan te trekken en te behouden. De toename in het aantal tweeverdieners vraagt om middelen om een goede balans tussen werk en privé te bevorderen. Tegelijkertijd maken moderne informatie en communicatietechnologieën (ICT) het meer dan ooit mogelijk om werk flexibel te organiseren (in termen van werktijden en werklocatie). Tegen deze achtergrond is er de laatste jaren meer aandacht gekomen voor 'werktijdcontrole' als mogelijk instrument om de gezondheid, werk-privé balans en motivatie van werknemers te behouden of zelfs te verbeteren, in een veeleisende werkcontext. Werktijdcontrole wordt gedefinieerd als 'de mogelijkheid van een werknemer om zelf de duur, planning en verdeling van de eigen werktijden te bepalen – hier voortaan afgekort als 'WTC'. Het doel van deze dissertatie is om inzicht te krijgen in de prevalentie van WTC in Nederland, en om empirisch te onderzoeken hoe WTC samenhangt met, - respectievelijk effecten heeft op - de gezondheid, werk-privé balans en werk-gerelateerde uitkomsten (bijvoorbeeld: werktevredenheid, motivatie en prestatie) van werknemers.

## Samenvatting van de onderzoeksbevindingen

In onze eerste studie gaven we een uitgebreid overzicht van bestaand empirisch bewijs voor associaties tussen WTC en diverse uitkomstmaten van de werknemer. We maakten hierbij onderscheid tussen verschillende aspecten van WTC ('subdimensies'; bv. controle over dagelijkse begin- en eindtijden van de werkdag, over pauzes of vrije dagen) en hun relatie met theoretisch relevante uitkomstmaten ([i] werk-privé balans, [ii] gezondheid en welzijn, en [iii] werk-gerelateerde uitkomsten). Een systematische selectieprocedure onder studies gepubliceerd tussen

1995-2011 resulteerde in een totaal van 63 relevante artikelen gebaseerd op 53 wetenschappelijke studies. De sterkste evidentie werd gevonden voor een gunstige samenhang tussen WTC en werk-privé balans, op basis van zowel cross-sectionele studies als interventiestudies. De evidentie voor een samenhang tussen WTC enerzijds en welzijn en gezondheid anderzijds was minder consistent. Dit suggereert dat WTC weliswaar positieve gezondheidseffecten kan hebben (bv. op burn-out en aandoeningen van het bewegingsapparaat) maar dat niet alle gezondheidsindices even sterk worden beïnvloed door WTC.

Op basis van onze systematische *review*-studie concluderen we dat WTC gezien kan worden als een veelbelovend instrument voor het succesvol combineren van werk en privé, en mogelijk ook voor het bevorderen van gezondheid, welzijn en werk-gerelateerde uitkomsten. Meer interventiestudies zijn echter nodig om een definitieve conclusie te kunnen trekken over de effecten van het verhogen van WTC binnen organisaties.

Onze tweede studie had tot doel een gedetailleerd overzicht te verschaffen van de prevalentie van zowel toegang tot-, behoefte aan-, als gebruik van WTC onder de Nederlandse beroepsbevolking. Daarnaast onderzochten we de prevalentie van een 'mismatch' tussen enerzijds de behoefte van werknemers aan WTC en anderzijds de toegang die ze daadwerkelijk tot WTC hebben. Ten slotte onderzochten we hoe deze WTC variabelen zich verhouden tot werk-thuis interferentie, vermoeidheid en motivatie van de werknemers. Er werden vragenlijsten afgenomen onder een grote, quasi-representatieve steekproef van de Nederlandse beroepsbevolking ($N$ = 2,420). Uit de statistische analyses bleek dat veel Nederlandse werknemers een redelijke tot zelfs zeer sterke behoefte aan WTC rapporteren, terwijl de daadwerkelijke toegang tot WTC in het algemeen minder prevalent was. Een 'negatieve mismatch' (dat wil zeggen, toegang tot WTC < behoefte aan WTC) bleek dan ook veel voor te komen onder zowel werknemers met reguliere werkuren, als onder werknemers die in ploegendienst werken. Deze 'negatieve mismatch' bleek samen te gaan met hogere werk-thuis interferentie,

hogere vermoeidheid en lagere motivatie. Gebruik van WTC was ook erg prevalent onder werknemers met toegang tot WTC, maar dit gebruik bleek niet samen te hangen met de onderzochte uitkomstmaten. Op basis van de bevindingen uit deze studie concluderen we dat een goede afstemming tussen behoefte aan- en toegang tot WTC belangrijk is voor het behoud van een gunstige werk-privé balans, vitaliteit en motivatie, maar dat een dergelijke goede afstemming voor veel Nederlandse werknemers geen realiteit is.

In de derde studie van dit proefschrift onderzochten we de effecten van een moderne, aan WTC gerelateerde interventie, namelijk 'Het Nieuwe Werken' (HNW). HNW is de afgelopen jaren een populaire vorm van werken geworden. Het behelst plaats- en tijdsonafhankelijk werk, vaak gepaard met verregaand gebruik van ICT en een prestatiegerichte managementstijl. We onderzochten de effecten van HNW op zowel de organisatie van het werk (veranderingen in zeggenschap over werktijden en werklocatie; de daadwerkelijke werktijden en werklocaties; en andere centrale werkkenmerken), als op de uitkomsten voor werknemers (werk-privé balans, gezondheid en welzijn, en werk-gerelateerde uitkomsten). Om een valide inzicht in de effecten van HNW te krijgen, pasten we een methodologisch sterk interventie-design toe, en brachten we bovendien de inhoud, het implementatieproces en de context van de interventie zorgvuldig in kaart. De studie werd uitgevoerd binnen een grote Nederlandse organisatie uit de financiële sector waar HNW werd geïmplementeerd ($N$ = 2,912). Op drie momenten werden data verzameld (één tot twee maanden voorafgaand aan de invoering van HNW, vier maanden na de invoering, en 10 maanden na invoering van HNW), zowel binnen een interventiegroep ($N$ bij voormeting = 2,391) als bij een referentiegroep ($N$ bij voormeting = 521).

De resultaten laten zien dat er na implementatie van HNW binnen de interventiegroep een sterke verschuiving plaatsvindt van werkuren op kantoor naar werkuren thuis. Tevens was er een significante reductie in reistijd binnen de interventiegroep. Toegang tot WTC werd echter niet significant beïnvloed door de interventie en bleef stabiel gunstig.

Werknemers bleven bovendien voornamelijk op doordeweekse dagen en overdag werken. Tevens bleven de psychosociale werkkenmerken, werk-privé balans, ervaren stress, vermoeidheid en werk-gerelateerde uitkomsten na invoering van HNW positief en grotendeels onveranderd. De gerapporteerde gezondheidsscore nam echter enigszins af na implementatie van HNW (ondanks de stabiliteit in de andere uitkomstmaten). Tezamen suggereren de uitkomsten van deze derde studie dat de invoering van HNW niet noodzakelijk hoeft te leiden tot veranderingen in psychosociale werkkenmerken, welzijn of werk-gerelateerde uitkomsten.

Samengevat impliceren de eerste twee studies van dit proefschrift dat WTC een veelbelovend instrument is om een gunstige werk-privé balans, gezondheid en welzijn, en werk-gerelateerde uitkomsten van werknemers te behouden of te bewerkstelligen. Daarnaast gaf onze tweede studie aan dat dit temeer geldt voor werknemers met een hoge behoefte aan WTC. De meerderheid van Nederlandse werknemers rapporteert een dergelijke behoefte aan WTC in redelijk tot zeer sterke mate, terwijl toegang tot WTC voor velen nog beperkt is. De derde studie liet zien dat het mogelijk is een verregaande en kostenreducerende HNW-interventie te implementeren en daarbij een gunstige werk-privé balans, welzijn en werk-gerelateerde uitkomsten te behouden.

## Theoretische implicaties

In dit proefschrift werden drie fundamentele mechanismen voorgesteld ter onderbouwing van de gunstige effecten van WTC. Ten eerste werd een 'recovery regulation' mechanisme verondersteld, waarbij WTC werknemers de mogelijkheid biedt om de dagelijkse werktijden af te stemmen op hun momentane behoefte aan herstel. Op deze wijze kan WTC de accumulatie van vermoeidheid en stressklachten tegengaan en zodoende ziekte of uitval op de lange termijn voorkomen. Ten tweede kan WTC fungeren als 'time-regulation' mechanisme en

werknemers in staat stellen hun werktijden beter af te stemmen op privéverplichtingen. Zodoende kan WTC helpen om negatieve werk-thuis interferentie te vermijden. Tot slot verschaft WTC werknemers een vorm van autonomie, hetgeen volgens diverse arbeids- en gezondheidspsychologische theorieën positief bijdraagt aan werk-gerelateerde uitkomsten (bijvoorbeeld: werktevredenheid, motivatie en prestatie). Bovengenoemde drie mechanismen worden onderschreven door de in dit proefschrift gevonden positieve associaties tussen enerzijds WTC en anderzijds welzijn en gezondheid, werk-privé balans en werk-gerelateerde uitkomsten (studie 1 en 2). Studie 2 uit dit proefschrift liet tevens zien dat (toegang tot) WTC de sterkste voordelen met zich meebrengt voor werknemers met een hoge behoefte aan WTC. Dit stemt overeen met een '*person-environment fit*' perspectief aangezien overeenstemming tussen de behoeften van werknemers en de aanwezige arbeidsomstandigheden en -voorwaarden van centraal belang blijkt te zijn voor het bevorderen van positieve uitkomsten voor de werknemer.

HNW vormt een relatief nieuwe en multidimensionale interventie met daarin een verregaande vorm van WTC. Onderzoek naar de effecten van HNW is nog zeer schaars. Ondanks de populariteit van HNW zouden mogelijke voordelen ervan (bv. verhoogde werkmotivatie, efficiëntie en werk-privé balans) weleens overschaduwd kunnen worden door potentiële nadelige bijeffecten (bv. verhoogde stress, vermoeidheid of werk-thuis interferentie door vervaagde grenzen tussen werk en privé, of afnemende sociale steun door thuiswerken). De verwachtingen van HNW lopen in de praktijk dan ook uiteen van positief ('zonnig perspectief') tot sceptisch ('somber perspectief'). In onze interventiestudie vonden we geen duidelijke effecten van HNW op een breed scala aan uitkomsten (waaronder psychosociale werkkenmerken, werk-thuis interferentie, gezondheid/welzijn, en werk-gerelateerde uitkomsten). Opmerkelijk was dat de implementatie van HNW ook geen effect bleek te hebben op de ervaring van WTC binnen de organisatie. Het uitblijven van zowel positieve als negatieve

effecten biedt noch ondersteuning voor het zonnige perspectief, noch voor het sombere perspectief op HNW. Aangezien de uitkomsten stabiel gunstig bleven na invoering van HNW, én omdat grootschalige interventies op de werkvloer vaak gepaard gaan met enige weerstand of andere negatieve bijeffecten, kan de stabiliteit en het uitblijven van duidelijk negatieve effecten voorzichtig als positieve uitkomst beschouwd worden.

Samengevat is de theoretische uitkomst van dit proefschrift tweeledig: WTC blijkt potentie te hebben voor het verbeteren of behouden van gunstige uitkomsten voor werknemers, maar verregaande, multidimensionale interventies op gebied van werkflexibiliteit - inclusief WTC (HNW) – zijn niet noodzakelijk effectief in het verbeteren van dergelijke uitkomsten. Er zijn meer interventiestudies van hoge kwaliteit nodig om definitieve conclusies te trekken over de effecten van HNW. Bovendien zijn er meer interventiestudies nodig om effecten van specifieke en minder verregaande toepassingen van WTC te toetsen (bv. effecten van controle over overwerk of vrije dagen).

## Praktische implicaties

Tegen de achtergrond van de voortdurende flexibilisering van werkuren, alsmede de recente initiatieven van de Nederlandse overheid om WTC toegankelijk te maken voor zoveel mogelijk werknemers, heeft het onderzoek uit dit proefschrift een grote praktische waarde. Ten eerste is een bredere implementatie van gematigde vormen van WTC aan te bevelen, gezien de in het algemeen veelbelovende bevindingen aangaande WTC uit dit proefschrift. Veel Nederlandse werknemers ervaren minder toegang tot WTC dan ze zouden willen hebben. Het verdient daarom voor organisaties de aanbeveling om de behoefte aan WTC (-subdimensies) onder hun werknemers zorgvuldig in kaart te brengen, en een hogere WTC toe te staan waar mogelijk. Bovendien vonden we dat een negatieve *WTC mismatch* (dat wil zeggen, een behoefte aan meer WTC dan waartoe men beschikking heeft)

veelvuldig voorkomt onder medewerkers in ploegendienst. Aangezien het werken in ploegendienst samenhangt met diverse belastende arbeidsomstandigheden en negatieve gezondheidsuitkomsten, zouden met name ploegendienstmedewerkers baat kunnen hebben bij een verhoging van WTC. Dit kan bijvoorbeeld gerealiseerd worden door de invoering van gematigde danwel uitgebreide vormen van 'zelfroosteren'.

De bevindingen van onze interventiestudie suggereren dat het mogelijk is om HNW in te voeren zonder psychosociale werkkenmerken of werknemersuitkomsten negatief te beïnvloeden. Hierbij is het wel van belang dat de inhoud, het implementatieproces en de context van de interventie gunstig zijn. De uitgebreide beschrijving van de HNW-interventie in dit proefschrift kan als leidraad dienen voor toekomstige HNW interventies. Op basis van de bevindingen van onze tweede studie, bevelen we aan dat dergelijke interventies voorafgegaan worden door een zorgvuldige inventarisatie van de behoefte aan flexibiliteit onder werknemers, om zodoende de mate van WTC af te kunnen stemmen op de behoeftes van de werknemers.

Gegeven (i) de hoge behoefte aan WTC (in combinatie met een relatief lage toegang tot WTC) onder de meerderheid van Nederlandse werknemers, (ii) de veelbelovende bevindingen rondom WTC met betrekking tot werk-privé balans, gezondheid, welzijn en werk-gerelateerde uitkomsten, en (iii) het ontbreken van ongunstige gevolgen (zelfs bij verregaande WTC-interventies), spreken onze bevindingen in het algemeen in het voordeel van WTC voorziening onder werknemers. Als zodanig steunen de bevindingen van dit proefschrift de recente overheidsinitiatieven (o.a. in wetgeving) die gericht zijn op het vergroten van WTC conform individuele wensen van de medewerker.

## Sterke kanten en limitaties

Dit proefschrift kent enkele belangrijke sterke kanten. Ten eerste pasten we een multi-methodisch paradigma toe om WTC te onderzoeken: We ondernamen een uitgebreide literatuur-review, een vragenlijstonderzoek onder een grote quasi-representatieve steekproef van de Nederlandse beroepsbevolking, en een zorgvuldig ontworpen interventiestudie. Daarnaast is het proefschrift breed georiënteerd: alle studies bevatten een veelvoud aan relevante uitkomstmaten (werk-privé balans, gezondheid/welzijn, en werk-gerelateerde uitkomsten) en de diverse steekproeven van de studies dragen bij aan de generaliseerbaarheid van de conclusies. Kernconcepten werden zorgvuldig gemeten, en hierbij besteedden we aandacht aan de verschillende subdimensies (aspecten) van WTC (bv. zeggenschap over begin- en eindtijden van de werkdag, zeggenschap over vrije dagen en pauzes) en tevens maakten we onderscheid tussen toegang tot WTC, behoefte aan WTC en gebruik van WTC. Tot slot biedt dit proefschrift een uitgebreide beschrijving van de inhoud en het implementatieproces van een populaire (aan WTC gerelateerde) interventie (Het Nieuwe Werken), alsmede een systematisch en empirisch onderzoek naar de effecten van HNW op WTC, (zeggenschap over) werklocatie, centrale psychosociale werkkenmerken en relevante werknemer-uitkomsten.

Een aantal beperkingen van onze studies moet echter ook in ogenschouw genomen worden, dat de stelligheid van de conclusies mogelijk beïnvloedt. In de eerste plaats vertegenwoordigt onze interventiestudie 'slechts' een enkele casus. Effecten van interventies hangen altijd sterk af van een veelheid aan diverse factoren, inclusief de inhoud, het implementatieproces en de context van de interventie, en kenmerken van de steekproef. Ten tweede was het in onze interventiestudie niet mogelijk deelnemers op willekeurige basis aan de interventie- of referentiegroep toe te wijzen, en beide groepen bleken niet geheel 'identiek' aan elkaar te zijn. Aldus kunnen er, op basis van deze dissertatie alleen, geen definitieve conclusies getrokken worden

over algemeen geldende effecten van HNW. Voorts impliceert de brede focus van het onderzoek dat in onze huidige analyses geen onderscheid gemaakt is tussen theoretisch relevante subgroepen (bijvoorbeeld op basis van geslacht, leeftijd of gezinssituatie). Dit kan ten dele de beperkte omvang- danwel het uitblijven van effecten verklaren. Betreffende HNW is het denkbaar dat bepaalde groepen werknemers wel degelijk baat hebben bij een toegenomen flexibiliteit, maar dat dergelijke positieve effecten gemaskeerd worden door nadelige effecten onder een andere groep werknemers. In toekomstige interventiestudies zou het relevant kunnen zijn om de rol van contextvariabelen (zoals welzijn, gezondheid, werk-privé balans ten tijde van de voormeting, alsmede persoonlijke voorkeuren, leiderschapsstijlen of attributies ten aanzien van de doelen van de interventie) mee te nemen in de analyse van effecten van aan WTC gerelateerde interventies (bv. HNW). Een laatste belangrijke beperking van dit proefschrift is dat het onderzoek volledig leunt op zelfrapportage. Hoewel het risico van '*common method bias*' volgens sommige wetenschappers slechts klein is, zou toekomstig onderzoek baat hebben bij het includeren van administratieve gegevens over bijvoorbeeld prestatie, ziekte of uitstroom van personeel als uitkomstmaten.

## Slotconclusie

Dit proefschrift draagt bij aan ons begrip van de relatie tussen WTC en relevante werknemer-uitkomsten. Op basis van onze bevindingen lijkt WTC een geschikt instrument om werk-privé balans, gezondheid, welzijn en werk-gerelateerde uitkomsten van werknemers te waarborgen of te verbeteren. Op WTC gebaseerde interventies zoals HNW hoeven echter niet noodzakelijk tot verbeterde uitkomsten te leiden wanneer deze 'uitkomsten' voorafgaand aan de interventie al relatief gunstig zijn. In dergelijke gevallen laten onze bevindingen zien dat het mogelijk is om kostenbesparende interventies aangaande flexibiliteit in werktijden en werklocatie in te voeren zonder de genoemde uitkomstmaten nadelig

te beïnvloeden. Implementatie van WTC-interventies zou idealiter vooraf gegaan moeten worden door zorgvuldige inventarisatie van behoeften aan flexibiliteit onder het personeel.

De prevalentie van flexibele werktijden zal de komende jaren naar verwachting blijven toenemen. In dat kader kunnen goed geïmplementeerde WTC interventies (dat wil zeggen, met een gunstige inhoud en een goed implementatie-proces) ten goede komen aan zowel werkgevers als werknemers. Het in kaart brengen van de effecten van toekomstige WTC-interventies onder diverse arbeidspopulaties en -settings blijft relevant voor zowel wetenschap als praktijk.

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# About the author/ Publications

## About the author

Hylco Hendrik Nijp was born at the 15th of September in Leeuwarden. After a biology assignment to study the behavior of ants, he decided to take this assignment one step further, and to study psychology and to examine human behavior. Attracted by the diversity of psychological courses that were offered by the university (and a bit by the 'southern climate' as well), Hylco went to study at the Radboud University in Nijmegen. After a Bachelor in social psychology, he finished the research master behavioural science (*cum laude*), with a thesis on the unconscious embodiment of motivation in human behavior, supervised by Rob Holland.

From unconscious embodiment of motivation, it was only a small step to a PhD on the effects of worktime control on work-home balance, health, well-being and motivation of employed individuals, a project enabled by a ZonMw research grant acquired by Debby Beckers. When offered the opportunity to join the research group Work, Health and Performance, Hylco gladly accepted the challenge and opportunity to broaden his interest and focus to this research field. During his PhD, he conducted four studies, attended various national and international conferences, and organized a conference on New Ways of Working, bringing together practice and research.

Hylco is currently employed as assistant lector at the University of Applied Science in Arnhem and Nijmegen. He now teaches courses in organizational psychology and strategic human resource management and leads and partakes in various research projects that address sustainable employability.

## Publications

**Nijp, H. H.**, Beckers, D. G. J., Geurts, S. A. E., Tucker, P., & Kompier, M. A. J. (2012). Systematic review on the association between employee worktime control and work-non-work balance, health and well-being, and job-related outcomes. *Scandinavian Journal of Work, Environment & Health*, *38*(4), 299-313. doi:10.5271/sjweh.3307

**Nijp, H. H.**, Beckers, D. G. J., Kompier, M. A. J., van den Bossche, S. N. J., & Geurts, S. A. E. (2015). Worktime control access, need and use in relation to work–home interference, fatigue, and job motivation. *Scandinavian Journal of Work, Environment & Health*, *41*(4), 347-55. doi:10.5271/sjweh.3504

**Nijp, H. H.**, Beckers, D. G. J., Van de Voorde, F. C., Geurts, S. A. E., & Kompier, M. A. J. (2016). Effects of New Ways of Working on work hours and work location, health and job-related outcomes. *Chronobiology International*, 33(6), 604-18. doi:10.3109/07420528.2016.1167731

**Nijp, H. H.**, Beckers, D. G. J., Kompier, M. A. J., Baaijens, C., & Geurts, S. A. E. An intervention study on self-scheduling among Dutch healthcare workers: Implications for experienced worktime control, satisfaction with schedules, and well-being (paper in progress).

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